TECHNOLOGY DEPT.

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

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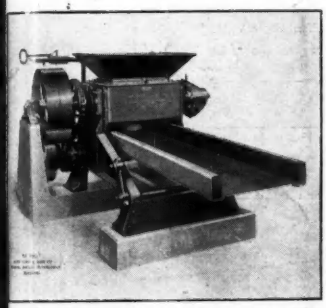
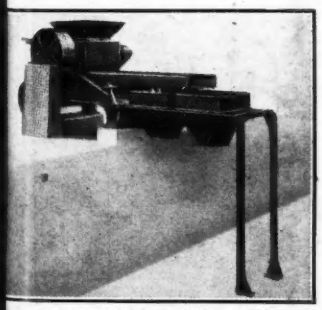
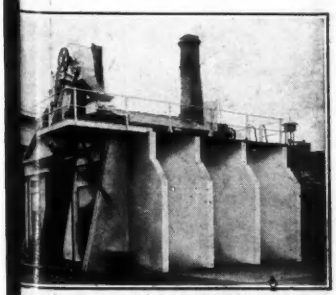


COKE CUTTING MACHINE WITH RECIPROCATING SCREEN



COKE CUTTING MACHINE SCREENING AND BAGGING UNIT



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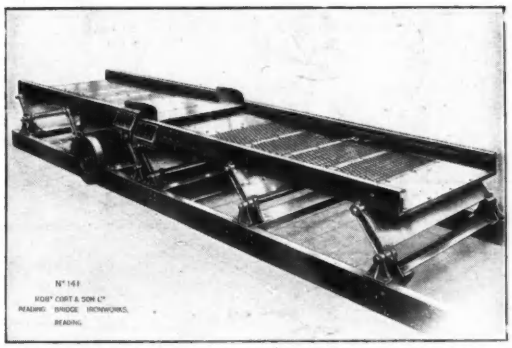

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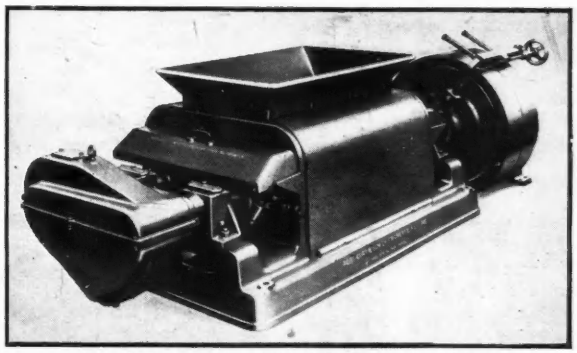

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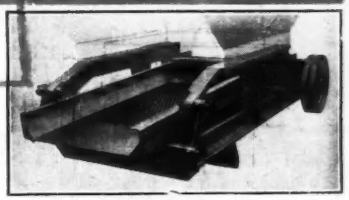
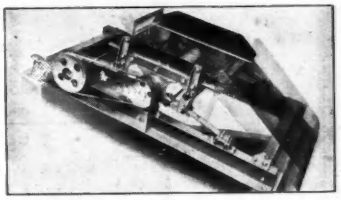


RECIPROCATING DEBREEZING SCREEN



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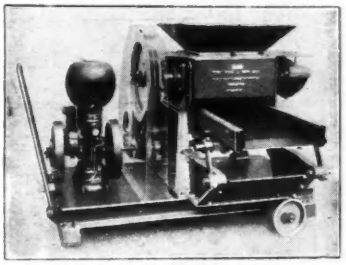

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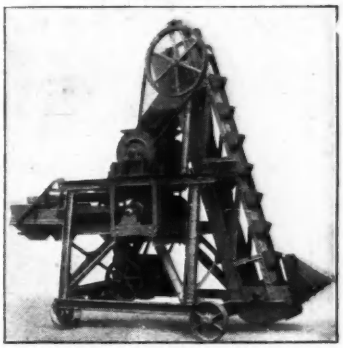
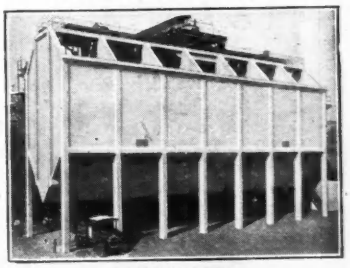


PORTABLE ELEVATING CUTTING AND SCREENING UNIT



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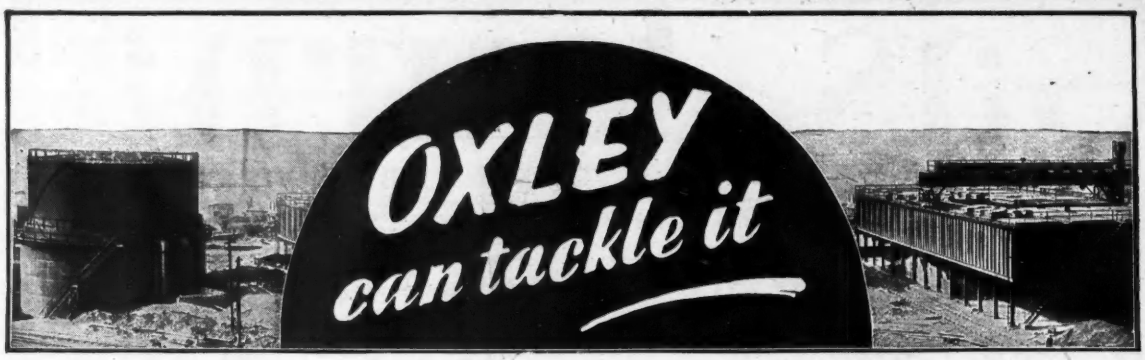

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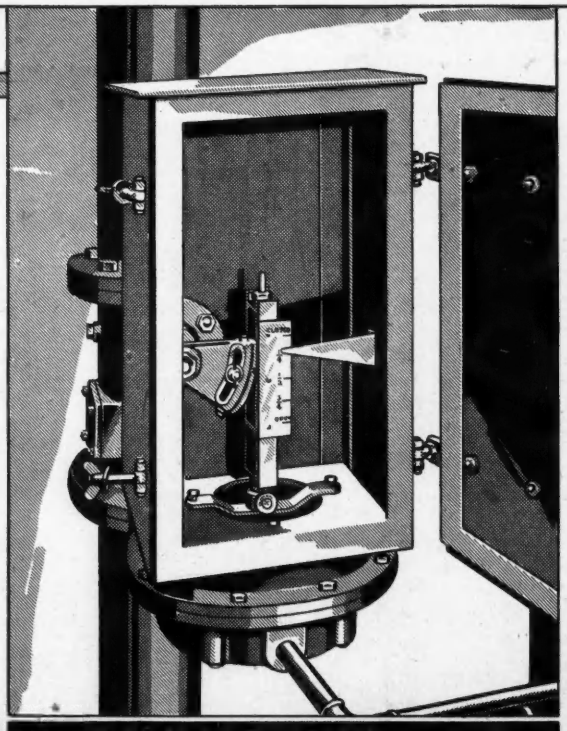

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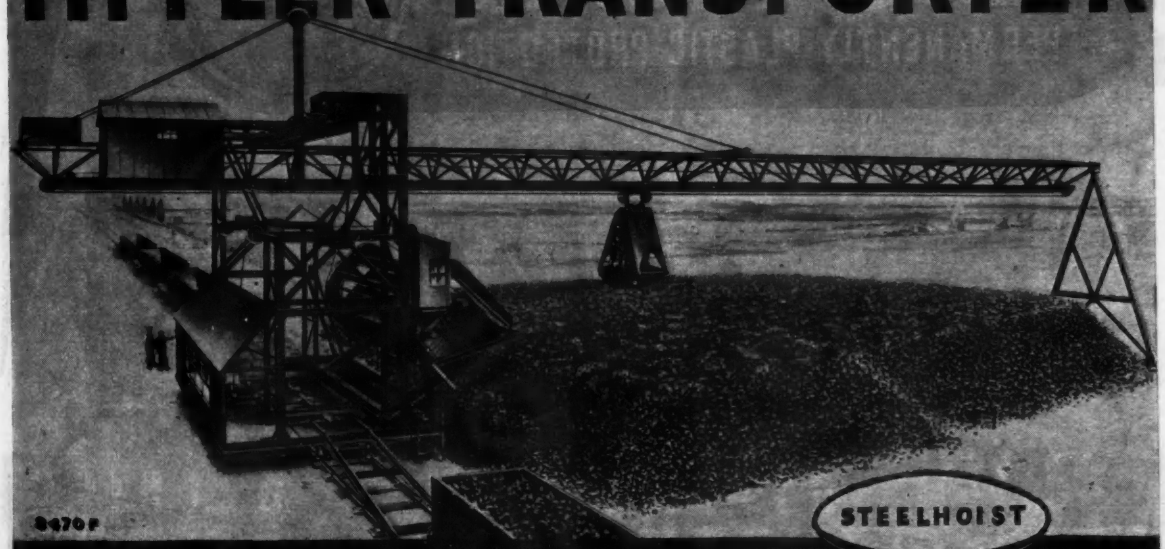

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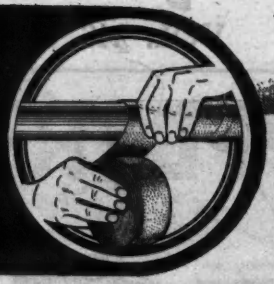

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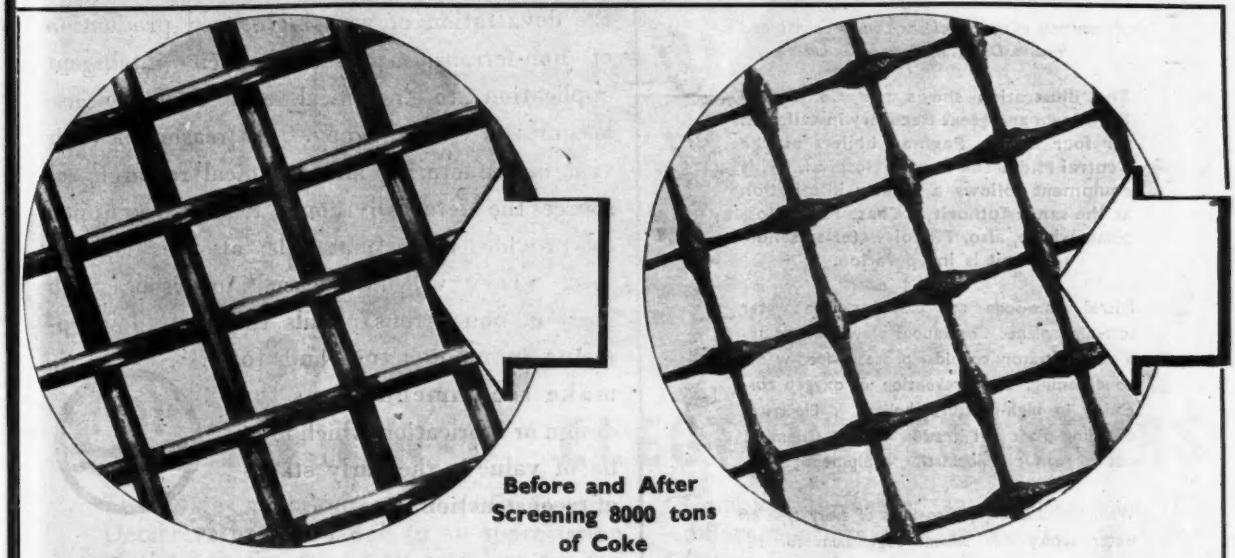

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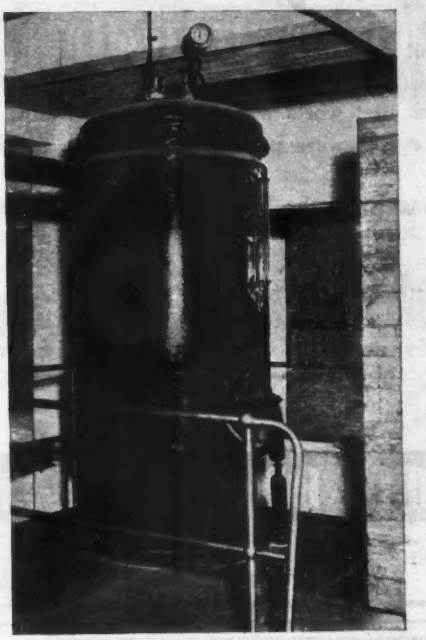

By courtesy of the Middlesex County Council and Messrs. Davey, Paxman & Co. Ltd.

The illustration shows the Continuous Blowdown and Heat Recovery installation for four Davey, Paxman boilers at the Central Middlesex County Hospital. This equipment follows a similar installation at the same Authority's Chase Farm Hospital, where, also, Filtrol water-softening plant is in operation.

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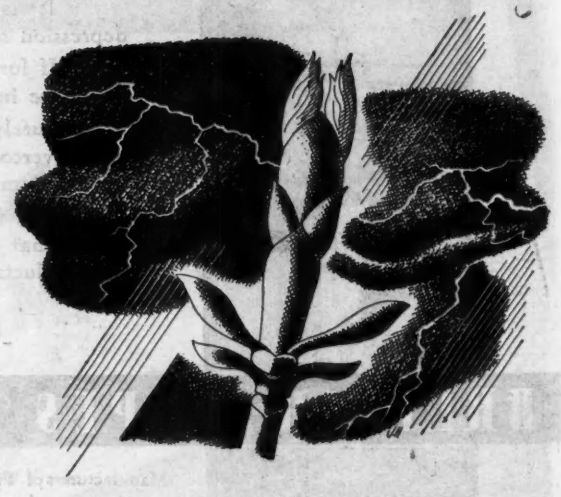

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M. 44

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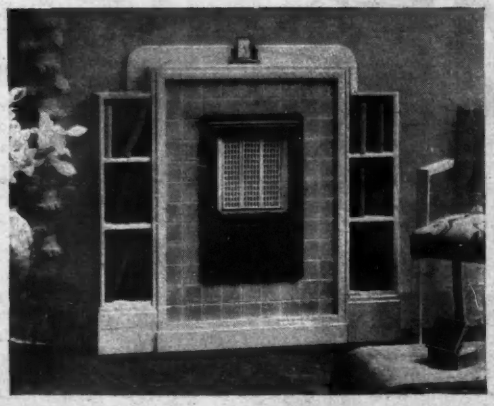

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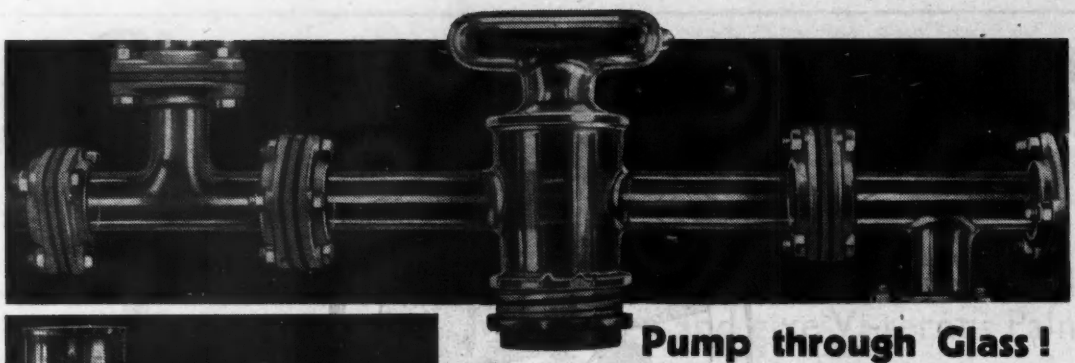

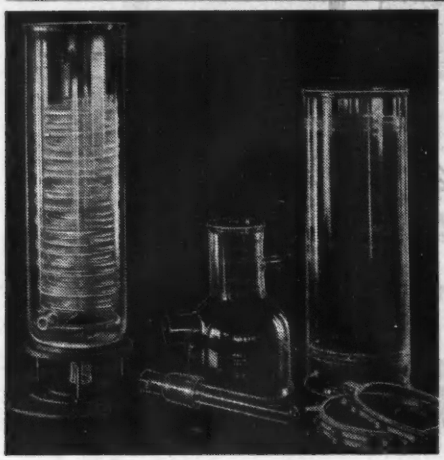

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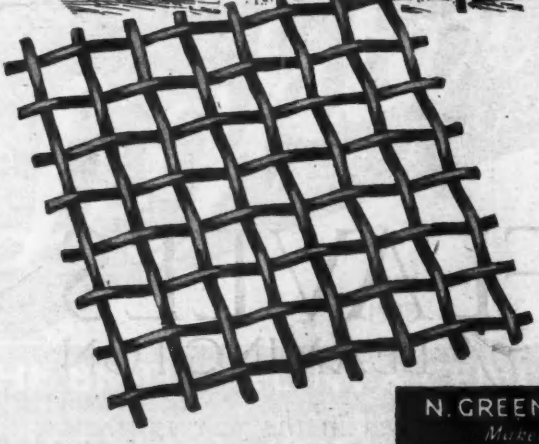

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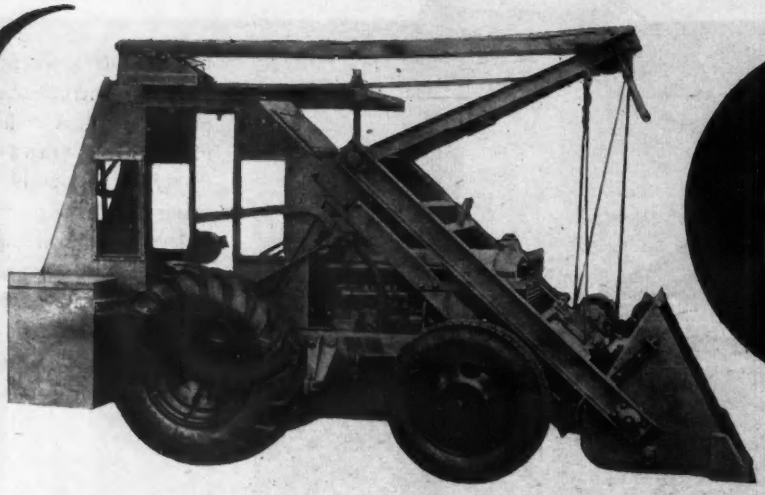

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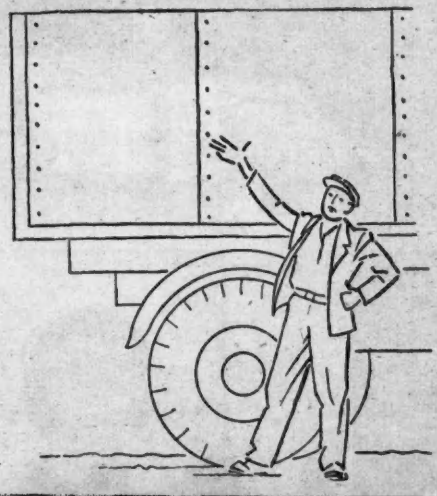

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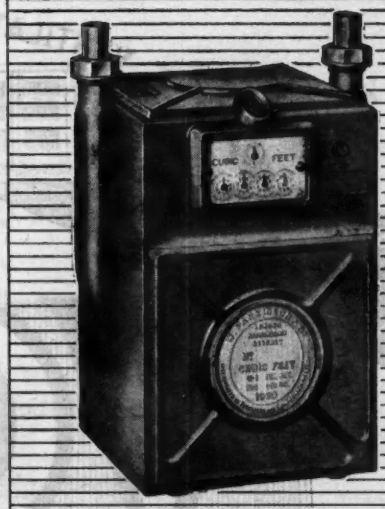

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p. 5

GAS JOURNAL, NOV. 28, 1945

VOL. 246 97th YEAR No. 4306

EDITORIAL NOTES

HIGHER TECHNICAL EDUCATION

THAT all is not well with technical education is evident from the report of the Examiners to the Institution of Gas Engineers. The Gas Industry is keenly alive to the need for attracting the best brains of the country into its ranks; so also is every other industry. The future of this country depends upon the excellence of its manufactures, upon the skill with which our technical men keep at least one jump ahead of the technical progress of the rest of the world, and in a word upon the attention paid to scientific research and to our enterprise in promoting technical innovation. Everywhere the cry goes up for more scientific men, for more technologists. The supply is not equal in quantity to the demand, and in the opinion of the Committee on this subject—the Percy Committee—which has lately reported, not even in quality. Here is a statement from the report on "Higher Technological Education" (H.M. Stationery Office, 6d.): "Whatever reservations must be made in estimating future industrial demands in terms of volume, there is no doubt about the urgency of the demand in terms of quality. It is especially a demand for men fitted for executive responsibility; and for men capable, not only of research, but of applying the results of research to development. In both respects, therefore, it is a demand for special qualities and for a high grade of ability and character. At present this demand is not being met; and the whole reputation of our national system of higher education in this field depends upon the extent to which it can be met in future." Let us add that Dr. E. V. Evans was a member of the Committee presided over by Lord Eustace Percy.

The first problem that the Committee endeavoured to solve was the difficulty of quantity. Why do boys leaving school not choose to take up some form of technology as a career? Why are non-industrial employments chosen in preference to industry by the brightest boys? There are many answers to this conundrum, not all of which are in the Percy report. One is that since the best boys tend to reach the higher schools, and since the higher schools are largely staffed by classical scholars, the boy at his most plastic period is predisposed to the professions rather than to industry. That can only be cured by giving science a larger place in the curriculum, and by appointing more masters with scientific training to the higher schools, including the Public Schools. Another answer is that boys leaving schools at 16 years of age tend to want action rather than study; that action is to be found in industry, but the boy enters a "practical" job, and never becomes trained for higher work except in exceptional cases. The Percy Committee has recognized this deterrent, and has strongly recommended that there should be a "road back" to full-time education after a period spent in the works. This would indeed be admirable, for academic study is never so attractive as when experience has shown that the textbooks contain not only knowledge but useful knowledge. Many educationists now believe that the best way to technological training is to sandwich a year or two in the works between two portions of the course.

§§

THE REMUNERATION PROBLEM

YET another answer is that technical men have been underpaid in the past (and often in the present) by comparison with commercial and professional men. As an enquiry made by the Cambridge Appointments Board has found: "There is still a fundamental snobbery which tends to regard those who deal with organization and finance as superior to those who deal with research and production." This is a deterrent to the ambitious. The Percy Committee recognizes that this feeling exists, for it insists on the urgent need for a national campaign to increase the prestige of the technical professions, and to counteract the impression that the road to responsible executive posts in industry does not lie through those professions. The Gas Industry, at least, can pride itself upon this—that the road to management generally lies through the gas-works. Every engineer who has vainly sought to convince his management of the desirability of some technical improvement will envy the position of the Gas Industry in that regard.

Having tackled the problem of persuading the young man to enter upon a technical career, the next problem is to provide him with adequate training. Dr. Drakeley, in a recent Paper to the British Association of Chemists, expressed one view of the problem in these words, after pointing to many examples of our pre-war dependence on foreign technologists: "The solution to this problem must be found in the countries which have challenged our former supremacy in world markets. Our competitors possess, not a personal superiority, but a recognized system of technical education varying up to a University degree in a technical subject. . . . Our universities provide technical courses—*e.g.*, engineering. Continental universities have only four faculties: theology, law, medicine, and philosophy. The technical universities or technical high schools are important institutions, sometimes over-shadowing the local university, which provide courses in the major branches of technology." It is upon lines similar to these that the Percy Report has directed its recommendations. It has recommended the selection of a limited number of colleges as Colleges of Technology to provide full-time courses as well as facilities for post-graduate study. It would establish eight Regional Advisory Councils to co-ordinate technological studies. It would have the Minister of Education establish a standing organization known as the National Council of Technology to co-ordinate the whole, and to see that the qualifications given by the Colleges are of uniform merit. The Regional Councils would associate themselves with a national campaign to increase the prestige of the technical professions.

ATTRACTION ESSENTIAL

THERE is the proposal. We have given no more than a cursory and incomplete account of the Committee's report. Its detailed proposals must be sought in the report itself. So far as the Gas Industry is concerned, the report will be welcomed. This industry has already gone some way along the road

indicated, but there is much yet to be done. The report is based on the need for the provision of technologists for industry. In that respect it resembles the Services with their insistence on "bodies" rather than on men and women. Whatever is done must be such as to appeal psychologically to the men and women who will be the raw material. Any successful scheme must cater for their needs, and not regard them as units to be coerced or regimented. The emphasis must be on attraction. The young man or woman must be attracted to the industry in which he or she is to work. There must also be an attraction towards a particular branch of technical work that is to be studied. That depends ultimately, in our opinion, upon what is done at the schools before the age at which the boy or girl is launched into industry or upon some other career. Industry must make friends with the headmaster—personally. Written school reports are not necessarily reliable. There is the story of the headmaster sucking his pen and asking a form master in worried puzzlement what he should put upon a final report of a boy who was leaving. "Soapy and pigheaded," suggested the form master. "Thank you," said the Head, "just what I wanted." Thereupon he wrote with a firm hand and an untroubled conscience: "He is firm but suave."

Industry must watch the progress of boys and girls in the last year or so of their school lives, and, having decided that particular individuals are the right material, must take in hand their further education and training—even to the extent of bearing the full cost of technological education. They will be no worse off for having spent a year or two in technical training, even if it is decided ultimately that some other calling will better fit their special gifts—or lack of special gifts. One thing is certain; industry generally is waking up to the fact that it must have more technical men of high calibre. The Gas Industry must see that it gets its share of whatever technical ability is going.

Personal

Mr. H. R. HEMS was re-elected Chairman of the Industrial Gas Centres Committee at a meeting of the Committee at Glasgow on Oct. 26.

* * *

Mr. HOMERE E. HASTINGS, formerly Bristol Branch Office Manager of Ascot Gas Water Heaters, Ltd., and late Production Controller of Langley Alloys, Ltd., has joined the staff of Friedman-Athill, Ltd., as Manager.

* * *

Mr. DARRELL W. REES, Engineer and Manager of the Pembroke District Gas Company, was recently re-elected a member of the Pembroke Borough Council. At the election there were 17 candidates for six seats, and Mr. Rees was placed third from the top of the poll.

* * *

Of the many employees now returning to Ascot Gas Water Heaters, Ltd., the management are particularly glad to welcome one of their oldest employees, Mr. G. N. BEHR, now released from the Navy after long service in Russia. Mr. Behr has resumed his duties as London Manager.

* * *

In filling the vacancies on the Court due to the death of Sir David Milne-Watson and the resignation of Sir Reginald Neville, the Directors of the Gas Light and Coke Company have taken the opportunity of raising the number of Managing Directors to three by appointing Mr. F. M. BIRKS and Mr. MICHAEL MILNE-WATSON to join the Court, and to share these responsibilities with the Governor, Mr. A. E. Sylvester. Mr. Birks relinquishes the position of Chief Engineer, which he has held since 1941, when he succeeded Mr. R. W. Hunter. He was appointed Deputy Chief Engineer in January, 1936, having first entered the service of the Company in 1921 as Mechanical Engineer at Beckton, where he remained until 1929, when he went to Westminster as Mechanical Engineer of the Company. Mr. Michael Milne-Watson, second son of the late Governor, has been Commercial Manager for some time, and has served in the Navy during the war. Mr. N. WILLSMER, Deputy Chief Engineer, becomes Chief Engineer in succession to Mr. Birks. Mr. Willsmer has been with the Company since 1905, and for six years prior to his appointment as Deputy Chief Engineer in 1943 he was Station Engineer at Nine Elms.

After 43 years' service with West's Gas Improvement Company, Ltd., Mr. T. A. TOMLINSON, M.B.E., is retiring from the position of Chief Engineer, which he has held for 27 years. His many friends will, however, be pleased to learn that his retirement will not entail any severance from the Gas Industry, as his services are being retained by the Company in a consultative capacity and for certain duties in which he is particularly interested, and he will therefore have a little more leisure to devote to his personal contacts. It was in 1902 that Mr. Tomlinson joined the Company, and after filling the positions of draughtsman, leading draughtsman, and chief draughtsman he was appointed Chief Engineer in 1918. His duties in that important position have brought him into contact with all sides of the Industry, and his genial personality and willingness to help others at all times have made him a host of friends. He has taken especial interest in the pupils who have served under him and in maintaining the unique characteristics of the Company's publication, *West's Gas*. His wider interests in the Industry have been reflected in his activities in the Institute of Fuel and in many contributions to the technical Press. "T. A. T." enters upon his partial retirement with the best wishes of all his many friends for continued good health and more power to his strokes with clubs and pen. Mr. J. W. CURTIS, M.B.E., A.M.I.Mech.E., has been appointed to succeed Mr. Tomlinson as Chief Engineer of the Company.

* * *

Mr. R. ROBERTSON, General Manager of the Bristol Gas Company, is retiring after 41 years' service with the Company. He was trained as a mechanical engineer, and entered the Gas Industry as Chief Draughtsman to the Bristol Gas Company. Two years later he became Superintendent of the Canons' Marsh Works, and was appointed Chief Engineer to the Company in 1918. He was made General Manager at the outbreak of war, and elected a Director in 1943. Mr. Robertson has served the Gas Industry in many capacities. He was President of the Institution of Gas Engineers in 1938–39, and President of the Southern Association of Gas Engineers and Managers in 1926. He is also a Past-President of the Bristol Association of Engineers, and has served as Chairman of the Western Branch of the Institution of Mechanical Engineers. His successor as Engineer and General Manager to the Company is Mr. JAMES CARR, who was educated at Bootham School, York, and served his articles under his father, the late Mr. Isaac Carr, at the Widnes Corporation Gas and Water Works. In 1924 Mr. Carr was appointed Assistant Engineer and Manager to the Stretford and District Gas Board. In 1936 he succeeded his brother, Col. W. M. Carr, as Engineer, General Manager and Clerk. During the 1914–18 War he was awarded the Military Cross and the Belgian Croix de Guerre, was twice mentioned in despatches, and for his services in restoring gas supplies at Stretford in 1940, following serious damage by enemy action, received the M.B.E.

Obituary

The death occurred at Felixstowe on Nov. 12 of Mr. H. L. JOHNSON, Chairman of the Fakenham Gas and Coke Company, the Midland Coal and Cannel Co., Ltd., and H. R. Howes & Co., Ltd. Mr. Johnson was also London agent for the Wharncliffe Silkstone Colliery Co., Ltd.

Diary

Dec. 5.—Domestic Development Committee: Gas Industry House, 2.15 p.m.

Dec. 6.—Town and Country Planning Association: Lunch-time meeting, 28, King Street, Covent Garden, W.C. 2. Talk and discussion on "Heating the Family Home."

Dec. 7.—North of England Gas Managers' Association (Auxiliary Section), Newcastle, 2.15 p.m.: Address by J. M. A. Mitchell, Newcastle and Gateshead Gas Company.

Dec. 8.—Scottish Junior Gas Association: Joint meeting of Eastern and Western Districts, Glasgow. Address by Dr. Harold Hartley.

Dec. 8.—Yorkshire Junior Gas Association: Demonstration of Flame Propagation by Professor D. T. A. Townend and Dr. J. E. Garside, Leeds University, 2.30 p.m.

Dec. 11.—Midland Junior Gas Association: Paper on "The Treatment of Water for Industrial and Domestic Purposes," C. J. Carter.

Dec. 12.—British Gas Council: Gas Industry House, 2.15 p.m.

Dec. 12.—Institute of Fuel, North-Western Section: "Waste Heat Recovery by Means of Recuperators," G. N. Critchley, Engineers' Club, Manchester, 2.30 p.m.

Dec. 14.—London and Southern District Junior Gas Association: Paper on "Design and Installation of Small Industrial Canteens," D. G. Winslow; Paper on "Bread Baking,' A. E. Livett.

Dec. 17.—London and Counties Coke Association: Finance Committee 11 a.m., Executive Committee 11.30 a.m., Central Committee 1.30 p.m., Gas Industry House.

Letter to the Editor

Commercial Prospects of Spent Oxide

DEAR SIR,—Mr. Irwin's letter in your issue of Nov. 14 raises a large number of questions, concerning which the following comments may be helpful:

(1) Where spent oxide is burnt in suitable hand-operated burners, the iron content of the Glover acid, 80% H_2SO_4, need not exceed 0.01% as iron (Fe).

(2) Spent oxide rarely contains more than 18% of Fe_2O_3—not 50% Fe_2O_3.

(3) There is no more suitable acid than that made from spent oxide which has been burnt in hand burners for the manufacture of sulphate of ammonia. The Company with which the writer is associated has produced the most attractive crystal form of neutral sulphate of ammonia, as "Metro Sulphate," for the last 26 years from spent oxide acid.

(4) The consistent production of Grade I sulphate of ammonia depends on a large number of considerations other than the correct quality of sulphuric acid being used.

(5) (*a*) The saturator must be correctly designed. (*b*) The velocity of the steam—ammonia, &c., stream through the perforations of the cracker pipe should be such as to maintain the crystals in suspension during their growth. (*c*) There must be an unvarying acidity of about 5% H_2SO_4. (*d*) There must be sufficient ferrous iron present to form a nuclear quasi alum. (*e*) The contents of the well of the saturator must not be stagnant: they must be agitated to keep the crystals, almost ready for ejection to the centrifuge, in a state of suspension. (*f*) When a suitable sized crystal has been obtained it is preferable to neutralize it in the basket with a weak solution of ammonia, rather than to rely on the use of soda ash or ammonium bicarbonate or other solid neutralizing media, all of which latter lead to the more rapid caking of the sulphate in the stores, particularly if the temperature of the sulphate stores is not maintained above dew-point.

(6) It is wrong to suggest that sulphuric acid made from spent oxide, even if the combustion is effected in mechanical burners with suitable dust arrestors, is the cause of undesirable crystal size.

(7) There are far more important factors, not least the unsuitable design of the saturator and imperfect working and control of the conditions in the saturator.

(8) In 1938, when spent oxide was commanding, say, 5d. to 6d. per unit of sulphur at the gas-works, it cost 6d. per unit of sulphur to extract the hydrocarbon-containing sulphur from spent oxide. At that time American and Sicilian sulphurs were being freely sold to the manufacturers of sulphuric acid at 10½d. per unit of sulphur, delivered at the acid works.

(9) The costs of extraction of sulphur by solvents have sensibly increased during the war years, and therefore the process is not an attractive one, even for large gas-works, to undertake, because the sulphur-free organic matter remaining involves the extraction of ferrocyanides (for which there is only a limited market), if the final material is to be suitable for utilization as a gas-purifying material.

(10) Further, spent oxides are not of uniform quality and texture, and they vary as regards chemical constituents. They reveal widely varying permeabilities to CS_2, and not less so to the removal of CS_2 by steaming after the sulphur has been extracted.

Again, the fractional crystallization of sulphur from carbon bisulphide solutions results in about 35% of the sulphur having a satisfactory colour; the second grade is not too attractive, and the residue—about 30%—is suitable only for the manufacture of carbon bisulphide.

(11) So far the recovery of sulphur from crude coal gas by liquid processes, although feasible, does not readily yield a high-quality sulphur. The sulphur slimes have associated with them tarry matter and cyanogen-containing bodies, the removal of which constitutes an extra expense of no mean order.

(12) *In any case, there is no process so cheap and so foolproof for the removal of H_2S from crude coal gas, even to the extent of traces, as the dry process of purification.*

Indeed, Mr. Irwin indirectly subscribes to this view in the early part of his letter, where he says: "During the war period some gas undertakings, at any rate, have found purification from H_2S to produce a trifle on the revenue side, instead of being a liability."

(13) It would be singularly unfortunate if gas undertakings resorted either to the extraction of sulphur by solvents or to liquid purification, and incurred substantial financial liability in the recovery of a sulphur of a not-too-attractive quality.

(14) On the other hand, gas undertakings should seek to produce the best quality of spent oxide. The sulphur content should not be less than 50%, the tarry matter should not exceed 2%, the ammonia should not exceed 1%, the moisture content should not exceed 10%, and the material should be disintegrated and screened so that it passes through a ¼-in. mesh screen, so as to render it suitable for combustion in mechanical burners.

(15) It is unfortunate that Mr. Irwin's works are so far removed from the areas where there are surplus supplies of spent oxide available. It is equally unfortunate that present coastwise freights are abnormally high, and equally, that railway rates constitute a hindrance to business.

(16) One is not oblivious of Mr. Irwin's unfavourable geographical position, and it is hoped that before long some assistance can be rendered him. But it would be highly inexpedient to resort to *unproven* processes at the moment. The next few years may witness different methods for the processing of coal, and maybe the recovery of sulphur in a more attractive form.

(17) Mr. Irwin may be able to reduce the quantity of iron in his spent oxide acid by concentrating it to 96%, simultaneously applying an oxidizing agent. The acid could then be broken down to the required strength for the rayon and transparent paper industries.

(18) As soon as a suitable and economic solvent is found, which will extract sulphur and not hydrocarbons from spent oxide, there is little doubt that plant for the extraction of sulphur would be erected, provided a reasonable preference were given to indigenous sulphur. It would be wrong to urge the Gas Industry to provide sulphur when the Treasury decline to allow dollars to be purchased, and then resort to the purchase of American sulphur when once the embargo on the purchase of dollars is lifted.

London. Yours faithfully,
Nov. 19, 1945. P. PARRISH.

Tayport Gas Department has announced that from the November survey the price of gas for domestic consumption will be increased to 6s. 3d. per 1,000 cu.ft. for the first 5,000 cu.ft. per quarter, and 5s. per 1,000 cu.ft. for the remainder.

The Forth Valley Industrial Council (representative of the castings and allied industries in the Falkirk, Grangemouth, and surrounding area), has received an intimation from the Ministry of Supply that approximately 1,150 castings industry workers would be released under the scheme now operating to secure workers for special industries. This announcement follows earlier efforts by the Council to ensure that adequate labour was forthcoming for the foundries in the area.

In Collaboration with the promoters of the *News of the World* Housing Exhibition at Newcastle, the Newcastle and Gateshead Gas Company has supplemented the display of gas appliances by exhibiting its own Newcastle unit. This can be assembled in line or in separate units, and consists of a package kitchen with waist-high gas cooker, refrigerator, water heater, clothes-drying closet, warming closet, and pan drawer. The Company's latest designs in panel gas fires and the new bedroom corner panel gas fire are also shown.

Automatic Control is to be adopted for the gas street lighting at Dundee. At present 66 men attend to the city's 7,234 lamps at a wages cost of £14,515, and it is estimated that with automatic control only 36 men will be required at a total wage of £7,914. Alternative systems are under consideration, entailing a capital outlay of £20,798 and £25,590 respectively, the cost of which would be recovered in just over three years as the result of savings in wages and gas consumption.

Members of the Gloucester Gas Light Company's Profit Sharing and Savings Scheme have received a bonus of 2% on their wages and salaries for the year ended June 30. At the 37th annual meeting it was stated that the bonus for the year totalled £1,163 against £1,087 for the previous year. Membership had increased to 326, due to the admission of new employees. Special attention was drawn to the amount of £2,736, which had been saved by members during the year. Increasing use had been made of the easy method of saving by deduction from wages. Interest at the rate of 4% was paid both on savings and on bonus accounts.

Mr. H. W. Willis, Accountancy Assistant, with over 50 years' service, Mr. E. Weddle, Clerk in the rents department for 51 years, and Mr. F. L. Dowsland, Cashier and Registrar, with 43 years' service, have retired from the Newcastle and Gateshead Gas Company and have each been presented with wallets of notes by the officials and staffs. The presentations were made by Mr. T. W. Alexander, Chief Accountant, Mr. E. D. Brown, Chief Rents Superintendent, and Mr. E. Crowther, Chief Engineer and General Manager, respectively. Mr. Weddle was one of the founders of the swimming club run by the company and has taught 100 employees to swim.

Since 1909 apprentices in the service of the Gas Light and Coke Company have been released for one day each week to attend approved classes at technical institutes. The scheme has now been extended to cover all grades of juvenile employees, both technical and clerical, and arrangements have been made for them all to attend appropriate continuation classes. Apprentices and similar young workers on the technical side attend junior technical institutes, and those on the clerical side attend junior commercial institutes. As the new Education Act is not yet in force, some difficulty is being experienced in certain areas in obtaining satisfactory accommodation owing to lack of teaching staff and schools, but on the whole the scheme is working smoothly.

More Thoughts on Post-War Housing

The Institution Paper on "Technical Aspects of the Gas Industry's Contribution to Post-War Housing" was discussed at a meeting of the Southern Association of Gas Engineers and Managers (Eastern District) at Gas Industry House on November 20. Mr. G. L. Braidwood presided, and Mr. **E. W. B. Dunning**, one of the three Authors, gave a brief summary of the Paper and answered points raised in the discussion.

The **Chairman** said he felt that what was required was a statement embodying the information given in the Paper together with all other relevant information, setting out comparative efficiencies and costs and giving two or three clear-cut alternative policies. The public liked a clear-cut scheme with clear-cut alternatives. There was enough dissension already on the different prices charged for gas in different areas. He imagined that if a consumer asked six different undertakings for a complete heating and cooking scheme he would get six very widely differing schemes put forward. The Gas Industry consisted largely of small undertakings which had neither the facilities nor the money for research or for finding out all the facts for themselves, and they had to rely on headquarters for a lead and for the necessary information. They had recently had a feast of gratuitous research presented to them in the PEP Report, from which it was evident that the greatest need was for a proper hot water supply. The report also made plain that the most unpopular job among the womenfolk was clothes washing; that there was a strong demand for drying cabinets; and that there was considerable resentment about the labour involved in ash removal from solid fires. There was a strong desire for economical bedroom heating and for heated towel rails in the bathroom. Every one of those functions could well be performed by gas. In the national Press comments on the report he noticed there was a considerable amount of information as to what electricity was prepared to do, but extremely little, if anything, about what the Gas Industry was going to do. With the enormous building programme in front of them, the present was an unprecedented opportunity for the Gas Industry, and one which would probably never recur during their lifetime, and the greatest possible publicity should be put out. The prime necessity was to put forward a coherent plan, but a start might be made by what he termed negative advertising. There was considerable prejudice against coke fires on the ground that they gave off injurious sulphur fumes, while other people said a gas fire overheated a room and that a dish of water was necessary to keep the atmosphere moist. The Gas Industry should emphasize the matter of smoke abatement and the service it could perform with regard to national fuel conservation, and should kill such fallacies as the notion that gasholders were very dangerous pieces of plant liable to explode at any time, and that gas-works were places where people constantly shovelled oxide that gave off strong sulphur fumes. Considerably more emphasis might be placed on the benefit of the coke fire. He had himself made several successful conversions after having convinced the people concerned that they would not be poisoned. The only unsuccessful case he could recall was that of a lady who thought her coke fire extremely uneconomical with regard to gas consumption until it was found that she imagined the gas should be kept on all the time the fire was in operation.

Background Heating

The approach of winter bore in upon him how uncomfortable 95% of our houses were. Very few had central heating, and in most cases only one room was decently warmed. Going from that one room into the cold atmosphere they tried to bring the dining room or bedroom up to a tolerable temperature in a short time by lighting a gas fire. The two most important and debatable points brought out in the Paper were those of hot water supply and background heating. The fact that a gas-coke combination was the most economical was clearly brought out. With regard to background heating, he did not feel that the flueless type of gas heater was really satisfactory, not so much on account of the fact that a certain amount of sulphur might be emitted—because admittedly that was harmless where the content had been reduced within a reasonable limit—but on account of the fact that the flueless heater increased the humidity of the atmosphere. Hot water radiators were in that sense preferable. With regard to hot water, coke was undoubtedly cheaper, but where both a coke boiler and a coke fire were employed there was a necessity to store two different grades of fuel. He was no lover of the multipoint instantaneous heater, and he did not think it was the best advertisement for gas. His own experience on several occasions was that it required too much maintenance. The gas-fired boiler was in his view a fine piece of apparatus, and he wondered whether some adjustment in favour of its use could be made by the use of suitable tariffs.

On space heating he considered the convection type of fire was a great advance, but there was still room for research on the correct method of heating a room. More use might be made of thermostatic control generally, and a great benefit to the Industry would be a further standardization of appliances.

Mr. **Dunning** said that whatever trouble had arisen from the products of combustion from the flueless background heater had been due to attempting to burn too much gas in a particular size of room. In background heating they were not concerned with warming a room completely, but only with taking off the chill, and he did not think they would get any smell. As to flueless heaters increasing the humidity, the main point was not an increase in humidity *per se*, but in the condensation found on cold walls, and that could be overcome by building structures with better heat-insulating qualities. In the United States, where considerable air conditioning was carried out, it was found that the heat required to humidify the air to correct comfort conditions was more than the heat required to warm the air. As to the Chairman's criticism of multipoint heaters, they found at Watson House that any troubles experienced were largely due either to poor fixing or poor maintenance. It was necessary to have a constant water pressure, and a tank supply was the best governor they could get to maintain constant pressure. With correct maintenance and adjustment they could get quite a satisfactory service, although they were not suggesting that the service was anywhere near so automatic as with a storage system. The storage system was by far the best and they had always advocated it. In considering the question of extravagance, they needed some statistics as to how much people were willing to pay for their hot water. When systems were installed there was a tendency for people to exaggerate the number of baths they intended to take, with the result that when a heater to meet those exaggerated requirements was installed it was found to be too expensive. With regard to gas-fired boilers they were about to do some experiments at Watson House with clock control, so that the boiler could be turned off at certain periods of the day.

Mr. **J. H. Dyde** (Slough) said that in addition to congratulating the Authors he would like to congratulate those who had been responsible for the shortened version of the Paper, which had been of great value to architects and others. The Gas Industry had not been doing too well in regard to temporary housing, but he was hoping that with the return of their men from the Forces they would be able to strengthen their "commando battalions" in their appeal on the domestic front. Their competitors had a very formidable weapon in the immersion heater. Although certain designs of it were inefficient, it appealed to the architect. It was easy to install and did not take up any space, whereas the Gas Industry's counter-weapon required a flue. In many houses they could not find a place for the circulator, and it had to be placed externally to the cylinder cover. In dealing with architects they had first of all to sense what sort of system they were after, particularly with regard to water heating, and then decide on that particular system. If they began to waver they might fall between two stools. The electrical people had definitely decided to push the immersion heater, and they had been very successful. So far as the costs of services to satisfy the full requirements of the functional codes were concerned, he had calculated these for his Company and they reached rather heavy sums per week. The pre-war figure of 5s. 6d. came out at 7s. 9¼d., but taking the full requirements of the functional codes the figure reached 9s. 6¼d. For an all-gas installation to reach the standard of Plan 1e the cost would reach 14s. without any special charge, and that was a considerable sum to ask people to spend. It could be done only if wages were maintained and there was sufficient work for everyone, and export trade flourished. When one considered that many a working man spent 2s. a day on cigarettes, there might be some justification for believing that the money could be found for an all-gas heating service. If the standard of living were raised, people would realize that they could spend these sums for comfortable homes. The Paper was exceptionally useful for day-to-day reference on dealing with architects and local authorities.

Where to Obtain Appliances

Mr. **Dunning**, in reply, said they were now attempting to produce what he might call an efficiency booklet, more in the nature of a catalogue of suitable appliances. It would consist largely of illustrations and information as to where the appliances could be otained. They were also preparing some information on the question of considering house plans. They were now getting three or four plans submitted every week by architects and builders, who asked what they thought of them from the fuel service point of view. Referring to electrical competition in the case of the Portal house, he thought it would be seen that it was only where electricity was owned by the municipality and the gas undertaking was company-owned that they encountered all-electric installations. In all other cases the situation was very much more favourable to gas. It might be of interest to know, on the fuel conservation question, that cooking by electricity meant mining 2½ times as much coal as for gas. With regard to the electrical people having made up their minds on the immersion heater, the explanation was simple—it was the only system they had; moreover, architects were enamoured of something that was cheap in first cost. Considering that in 60 years a tenant spent two to three times the cost of the house on fuel bills, it was worth while thinking of running costs. In the case of an immersion heater in a Portal house, the Ministry of Works was working on the basis of a stand-by

loss of five units per week. Practical tests, however, had shown that the stand-by losses were seven units per day. Taking an all-gas house at present-day costs, the service was comparatively expensive, but for combinations of gas and coke the service would work out at from 7s. to 8s. at present-day prices. It would work out as economical, or more so, than solid fuel. If the service was really worth having, people would have it.

Mr. **W. A. Howie** (President of the main Association) said his impression after going about various districts was that whether the price of gas was 10d. or 1s. 1d. a therm, if the lady of the house wanted a gas cooker she was going to have one. Electricity was very cheap in Maidstone, but that did not deter the womenfolk from coming into the showroom and asking for gas cookers. On the question of water heating, he recalled that some years ago when he was at Gravesend, the electricity people offered electric heaters at 7s. 6d. a quarter, with electricity at a halfpenny a unit. To meet the challenge the gas undertaking offered Ascot heaters at the same terms, 7s. 6d. a quarter, installed free of charge. The cost to the Company was about £9 for the heater, and £4 10s. for fixing. In that small town they fixed nearly 2,000 heaters, almost all of the consumers being working people. Three gas fitters during that period did nothing else but maintain the heaters. They were attended to every six months, and they had no difficulties whatever, although the water was extremely hard. The secret of the success of the instantaneous heater was regular maintenance. He was surprised to hear from the Chairman that before the war 95% of homes were uncomfortable. He was not impressed with background heating, but would prefer, for the sake of an extra 2d. or 3d. an hour, a fire of the Cinderella type in the hall. In an ordinary room 15 ft. square he found an ordinary coke fire sufficient for all his requirements. Admittedly one could not control it as well as one could control gas. With regard to central heating, the Chairman had suggested the development of thermostatic control, and the Author had mentioned the use of clock control. Speaking from experience of such gadgets he suggested that a clockwork control should be the very last piece of apparatus to be put into the home.

Mr. **Dunning** said it must be borne in mind that they were dealing with lower income group houses; there was always a tendency for the gas manager and the salesman to think of people more in their own position rather than as consumers of whom 90% were earning less than £5 before the war, and probably 80% below £3. In talking about hall heating, Mr. Howie had spoken of an extra 2d. or 3d. an hour, but that was a very big matter for the working-class consumer. He agreed with Mr. Howie on the question of gadgets, but suggested that an electric clock might be found to be very foolproof. He thought a lot might be done in future by a combination of gas and electricity, rather than by keeping them separate and isolated.

A vote of thanks was accorded to Mr. Dunning on the proposition of Lieut.-Col. **J. A. Gould**, seconded by Mr. **G. R. Bullwinkle.**

Fuel Economy Review, 1945*

The invention of the atomic bomb as an instrument of warfare and the speculations it has evoked as to the practicability of employing atomic disintegration as a source of energy in substitution for fuel are given prominence in the 1945 *Fuel Economy Review*. In relation to the feasibility of harnessing this new source of power for useful constructive purposes, it is pointed out that several considerations require to be taken into account. On the one hand, the question of cost arises, as it is obvious that a project stated to have cost £500 million (a figure which exceeds the probable capitalization of the whole of the British coal mines) and to have employed more than 80,000 people, must give rise to serious doubts about the availability and cost of preparing the requisite materials. Also, the consideration whether the rate of energy release can be controlled is a matter which may vitally affect the possibility of commercial use; high explosive is not usually favourably regarded as a fuel. It would be rash, however, to assume that a complete answer to either of these questions is yet available, or that it is necessarily the last word on the subject, nor should the possibility be excluded that other means or methods of disintegration may be found to give more useful and manageable results for commercial purposes.

Prominence is also given in the *Review* to a summary of the Paper on "Gas—In Industry at War" which H. R. Hems, Chairman of the Industrial Gas Centres Committee, presented at the 1945 meeting of the Institution of Gas Engineers. D. L. Copp (South Metropolitan Gas Company) contributes an article on "Terminal Heat Losses in Industry," and Dr. A. Parker, Director of Fuel Research, discusses "Coal and Atmospheric Pollution."

Coal production is reviewed from many angles. Besides a summary of the Reid Report there are articles on the winning of coal at a modern British colliery and coal in the machine age. "The Contribution of the Grid to the War Effort" is summed up in extracts from the 1944 Annual Report of the Central Electricity Board.

* Published by the Federation of British Industries, 21, Tothill Street, London, S.W. 1. (Price 2s. 6d.)

London Juniors visit Beckton

On Oct. 31 the London Juniors had the first official opportunity of any technical association of viewing the damage caused to what we now know to have been one of the principal targets of the Luftwaffe. But, more important still, they were able to witness for themselves at first-hand how the engineering staff of the world's largest gas-works had not only performed marvels of improvization in order to maintain London's principal source of gas supply, but had also found time to carry out an incredible amount of permanent repairs.

Over 100 members under the leadership of the President, Mr. L. W. Andrew, were received by Mr. F. M. Birks, Chief Engineer (now Managing Director) of the Gas Light and Coke Company; Dr. H. Hollings, the Company's Controller of Research; Mr. Stephen Hay, Station Engineer; and Mr. G. Dougill, Chief Assistant Engineer at Beckton, who was one of the war-time Presidents of the Association.

Starting at the H.P. pumping plant the visitors saw four Allen-Reavell units each operating at 300 lb. steam pressure and delivering 2 million cu.ft. per hour at 150 in. W.G. pressure. Passing next to the Dri-Gas plant they inspected the washers, three of which were completely wrecked when the works was heavily bombed on Sept. 7, 1940. Crossing the level crossing it was difficult to realize that they had twice been heavily cratered by bombs. The damage has now been completely repaired. Nearby are the remains of Nos. 6 and 7 holders. These were so badly damaged that the bells have been "written off" and dismantled. No. 9 holder was wrecked by a paramine in March, 1941, and the tank is now being prepared prior to re-erection of the holder.

The booster house was wrecked by one central H.E. bomb in April, 1941, when three 2-million cu.ft. per hour and three 3-million cu.ft. per hour gas boosters were destroyed. These have been replaced by boosters which are now at work in a temporary building. The carpenters' shop was completely destroyed by incendiaries during the first raid on Sept. 7, 1940, and the repair work provides an excellent example of war-time improvization. The benzole plant with its eight absorbers each holding 10 tons of English carbon provided the next item of interest. This plant is capable of treating 57,000,000 cu.ft. of gas per day, and can produce 20,000 gall. of benzole per day.

The visitors were next able to inspect No. 3 coke oven plant site, where 30 additional Koppers Ovens are to be erected, together with a 3,600-ton bunker and coke wharf. This is on a piled foundation comprising 400 40-ft. piles. The site is sufficiently large to leave room for 60 more ovens to be erected later. Considerable interest was shown in the new by-product plant for the No. 3 battery, where the primary condensers will cool the gas to 10°F. above water. The present purifiers comprise eight streams of four boxes, each 35 × 30 ft., containing 100 tons of oxide in two 18-in. layers, with split flow. The gas is measured by three Connersville meters, each having a capacity of 250,000 cu.ft. per hour, checked by one Parkinson drum meter of equal capacity.

On the return journey the visitors saw No. 1 holder, which was badly damaged by a bomb which blew out two columns and a large hole in the side sheeting on Sept. 7, 1940. It has now been patched and put to work again. No. 2 holder was completely wrecked, and has now been replaced with a million single lift spiral guided holder. It was erected without emptying the tank by supporting the sheets as erected on 28 tension screws. By operating these simultaneously the holder was lowered into the tank as each ring was added. When landed, the trussing was erected from the dumpling and finally the crown sheeting.

At the conclusion of the visit the party was entertained to tea by the Company. Mr. Stephen Hay welcomed the Association to the first post-war visit to Beckton works. Mr. Birks also welcomed the party on behalf of the Company, and made special reference to the damage caused to holders by enemy action.

The President proposed a vote of thanks to all who had made the visit such a success, and to the Gas Light and Coke Company for all they had done for the Association. Mr. R. F. Twist, Past-President, seconded the vote of thanks.

Western Juniors

A meeting of the Western Junior Gas Association was recently held at the Showrooms of the Exeter Gaslight & Coke Company, where a welcome was extended by Mr. H. H. Brown, Engineer and General Manager. A Paper relating to water heating appliances, entitled "Evaluation of Performance," was given by Mr. Leopold Friedman (see "JOURNAL," Nov. 21, page 718), and a brisk discussion followed. A vote of thanks to the hosts was proposed by Mr. E. W. Atkins (Bath) and seconded by Mr. A. R. Langford (Plymouth), Mr. Brown replying.

Low Temperature Carbonisation, Ltd., announce that their head office has now returned from Yorkshire to London, and their address is now Grosvenor Mansions, 82, Victoria Street, S.W.1. (Telephone: Victoria 8701.)

Institution of Gas Engineers

6th Report of the Chairmen's Technical Committee, 1944–45

[*Submitted at the Autumn Research Meeting, Nov. 27–28.*]

THE membership of the Chairmen's Technical Committee is: S. E. Whitehead, B.Sc., M.Inst.C.E., M.I.Mech.E. (*Chairman*); E. V. Evans, O.B.E., D.Sc., F.R.I.C.; F. M. Birks, C.B.E., M.I.Mech.E.; C. F. Botley, M.Inst.C.E.; Lt.-Col. F. J. Bywater, M.C., M.Inst.C.E.; H. J. Escreet, B.Sc.(Eng.), M.Inst.C.E.; J. T. Haynes, Assoc.M.Inst.C.E.; H. Hollings, D.Sc., F.R.I.C.; T. F. E. Rhead, M.Sc., F.R.I.C.; R. J. Rogers; F. C. Smith; Col. H. C. Smith, C.B.E., D.L., M.Inst.C.E.

The President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex-officio*).

The co-ordination of the work of the Technical Committees of the Institution has been continued by the Chairmen's Technical Committee, and reports on the work of the Committees have been made to the Council. The inclusion of the Chairmen of the Technical Committees of the Gas Research Board in the membership of the Committee ensures close collaboration between the technical work of the Institution and of the Gas Research Board.

In spite of the very busy time which members of the Technical Committees have experienced during the war and of the difficulties of travelling and accommodation imposed by present conditions, the work of Committees has been actively continued. The loyalty and keenness of all the members of the Technical Committees in these particularly difficult times are greatly appreciated by the Institution and by the Government Departments concerned, with which close collaboration has been maintained.

The Institution also continues actively to co-operate, through the Gas Industry Committee, Technical Committees and otherwise, with the British Standards Institution in the preparation of British Standards. Both the Institution and the Gas Research Board are contributors to and are represented upon the Executive Committee of the Parliamentary and Scientific Committee.

The Institution Gas Research Fellowship is at present held by R. E. Jones, B.Sc., an account of whose work during the past year is a separate publication. A short note of this work is included at the end of this Report.

Codes of Practice Sub-Committee

The membership of the Codes of Practice Sub-Committee and its Drafting Panels is:

Codes of Practice Sub-Committee.

Lt.-Col. F. J. Bywater, M.C., M.Inst.C.E. (*Chairman*); R. D. Keillor; R. J. Rogers; the Chairman of each Drafting Panel; F. C. Button, F.R.I.B.A., F.S.I. (representing the Royal Institute of British Architects); Director of Fuel Research (representing the Department of Scientific and Industrial Research); P. Good, C.B.E. (representing the British Standards Institution); B. Svenson (representing the Building Industries National Council).

Drafting Panels.

Panel A (Gas Service Pipes): H. J. Escreet, B.Sc.(Eng.), M.Inst.C.E. (*Chairman*); S. T. S. Musgrove; H. Singleton, M.I.Mech.E.; N. S. Smith.

Panel B (Gas Metering and Gas Installation Pipes): W. K. Tate, M.A., Assoc.M.Inst.C.E. (*Chairman*); C. R. Austen; B. J. Bell; H. M. Browne, M.C.; A. J. Garward.

Panel C (Gas Lighting): F. C. Smith (*Chairman*); J. B. Carne, B.Sc.; W. J. G. Davey, B.Sc.; W. Hodkinson; E. Howard; J. M. A. Mitchell.

Panel D (Hot Water Supply by Gas): D. Chandler (*Chairman*); L. Friedman; R. N. Le Fevre, A.M.I.Mech.E.; H. P. Lupton, B.Sc., A.R.I.C.; J. M. A. Mitchell; T. F. C. Potterton; A. St. Leger.

Panel E (Space Heating, Cooking, Refrigeration by Gas): J. E. Davis, F.R.I.C. (*Chairman*); L. W. Andrew, B.A., B.Sc.; H. Davies, B.Sc.; D. M. Holloway, B.Sc.; A. C. Long; J. M. A. Mitchell; W. L. S. Spinks.

Panel F (Flues for Gas Appliances): L. W. Andrew, B.A., B.Sc. (*Chairman*); W. A. Bishop; H. M. Browne, M.C.; T. Smith; F. H. Swain.

Panel G (Gas-heated Appliances for Laundering and Ancillary Domestic Purposes): R. N. Le Fevre, A.M.I.Mech.E. (*Chairman*); W. F. Andrews; E. E. Blandon; G. W. Brooks, B.Sc.; D. Chandler; A. St. Leger; H. P. Lupton, B.Sc., A.R.I.C.; J. M. A. Mitchell.

Liaison Officer: H. G. Ellis.

The resignation from Drafting Panel E of Dr. H. Angus, M.Sc. (Birmingham) is reported with regret. His place has been taken by Mr. D. M. Holloway, B.Sc. (Birmingham). Mr. A. C. Long (London) has been appointed as an additional member of the Panel.

A Drafting Panel (G) has been set up under the chairmanship of Mr. R. N. Le Fevre (London), for the purpose of preparing a Code of Practice dealing with Gas-Heated Appliances for Laundering and Ancillary Domestic Purposes. This Code has been submitted to the Engineering Services Sectional Committee of the main Codes of Practice Committee and should shortly be available for circulation.

The Sub-Committee and its Panels have been busy throughout the year with the work of preparing the Codes of Practice, and amending them as was thought desirable in the light of comments submitted at the various stages. The Sub-Committee reports that the first nine General Series Codes undermentioned have been circulated by the British Standards Institution for general comment:

Gas Installation Pipes.
Installation of Gas Service Pipes.
Gas Metering and Consumers' Control.
Space Heating by Independent Gas Appliances (Single Family Dwellings).
Flues for Gas Appliances.
Gas Cooking Installations (Single Family Dwellings).
Gas Lighting (Single Family Dwellings).
Hot Water Supply by Gas (Single Family Dwellings).
Installation of Gas Operated Refrigerators.

The attention of the Sub-Committee and Panels is now being given to the preparation of further Codes of Practice relating to:

Domestic Hot Water Supply by Gas for buildings other than Single Family Dwellings and Schools.
Domestic Hot Water Supply by Gas for Schools.
Gas Cooking Installations for Schools and Meal Centres.
Gas Lighting for Buildings other than Single Family Dwellings.
Installation of Gas Fired Central Heating Boilers.
Space Heating by Independent Gas Appliances in buildings other than Single Family Dwellings.

The Sub-Committee again records its appreciation of the valuable services of its Liaison Officer (Mr. H. G. Ellis, London), who has attended the meetings of all the Panels and of the Sub-Committee, and who has maintained close contact with the officials of the Ministry of Works and with the Codes of Practice Committee.

Co-ordinating Committee of Gas Engineering Advisory Boards

The membership of the Co-ordinating Committee of Gas Engineering Advisory Boards is:

S. E. Whitehead, B.Sc., M.InC.E., M.I.Mech.E. (*Chairman*).
C. F. W. Rendle (*Vice-Chairman*).

Members of the General Purposes Committee: The President, the two Vice-Presidents, three Honorary Councillors, four senior Ordinary Members of Council and the Honorary Secretary of the Institution.

Chairmen and Secretaries of Regional Boards: (No. 1) J. R. Bradshaw, B.Sc.(Eng.); R. H. Duxbury. (No. 2) N. Hudson; G. A. Bentley. (No. 3) J. Mitchell; W. L. Bray. (No. 4) T. C. Battersby; J. Hunter Rioch. (No. 5) F. M. Birks, C.B.E., M.I.Mech.E.; W. K. Tate, M.A., Assoc.M.Inst.C.E. (No. 6) P. G. G. Moon, O.B.E., M.Inst.C.E.; J. T. Haynes, Assoc.M.Inst.C.E. (No. 7) W. J. Baker, A.M.I.Mech.E.; J. T. Spencer. (No. 8) J. F. Rust; E. M. Edwards. (No. 9) C. F. W. Rendle; F. H. Bate, B.Sc. (No. 10) F. G. Shaw; F. Johnston. (No. 11) James Jamieson; R. Sturrock. (No. 12) E. L. Nicholas; M. L. Pitt.

Ex-officio: W. J. Smith (Secretary, Gas Advisory Committee to Ministry of Fuel and Power).

Co-opted: G. le B. Diamond, M.I.Mech.E.

The Committee has to report, with great regret, the death of two of its members, Mr. George Dixon, O.B.E., B.Eng., M.Inst.C.E. (Nottingham), and Mr. A. H. Clucas, M.B.E., M.Sc. (Leeds). Both had been associated with the Committee since its inception, Mr. Dixon as Chairman for No. 3 (North Midland) Region, and Mr. Clucas as Secretary for No. 2 (North-Eastern) Region, and their loss is a sad blow to the Committee and to their respective Boards.

Mr. J. Mitchell (Leicester) has been appointed Chairman of No. 3 Advisory Board, in the place of the last Mr. Dixon, and Mr. G. A. Bentley (Elland) has been appointed Secretary of No. 2 Advisory Board, in the place of the late Mr. Clucas.

It is with regret also that the resignation of Mr. C. S. Shapley (Leeds), through ill-health, from the Chairmanship of No. 2. Advisory

Board, is reported. Mr. Shapley had been Chairman of No. 2 Board since its inception, and his guidance and assistance will be greatly missed. Mr. N. Hudson (Mirfield) has been appointed to succeed Mr. Shapley as Chairman of No. 2 Advisory Board.

It is with pleasure that the Committee records its congratulations to one of its members, Mr. F. M. Birks (London), upon whom the honour of C.B.E. has been conferred.

In spite of the great difficulties of travelling and of the many calls upon the time of the members of the Committee, meetings have been held regularly at which the Progress Reports of the Chairmen of the Boards have been discussed. These meetings have been attended, by invitation, by the Director of the Gas and Electricity Division of the Ministry of Fuel and Power (Mr. R. Kelf-Cohen) and by members of his staff, and reports are made at regular intervals to the Director of the work of the Boards and of their difficulties. The discussions at the meetings of the Committee with the representatives from the Ministry of Fuel and Power have concerned mainly the unsatisfactory position in regard to the supply and quality of coal and the very acute shortage of labour with which the Industry has been confronted, and the Committee wishes to record its gratitude for the sympathetic appreciation of these problems by the Director and his staff. The winter of 1944–45 was a particularly severe one which, when coupled with the difficulties that have already been mentioned, due to the hazards of coal supply, of coal quality and of labour, imposed a great strain upon the Gas Industry. Nevertheless the Industry managed to meet, almost without exception, the heavy demands made upon it, and, as the Reports of the Boards indicate, was able to maintain a high standard of efficiency of carbonization and of fuel utilization. The work of the Gas Engineering Advisory Boards has contributed in no small measure to these results. This work and the willingness of Gas Undertakings throughout the country to collaborate in it are greatly appreciated.

District Heating Committee

The membership of the District Heating Committee is:

C. A. Masterman, M.A., M.I.Mech.E., F.R.I.C. (*Chairman*); J. E. Davis, F.R.I.C.; G. C. Pearson, M.Inst.C.E.; N. S. Smith; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex-officio*).

Co-opted: W. Hodkinson; C. H. Leach, M.A.; C. E. Sanderson, B.Sc.; W. L. S. Spinks.

The Committee has met on several occasions during the year to consider proposals which have been made in various parts of the country for the installation of district heating schemes depending upon the distribution of hot water or of steam, and has paid regard to published information of experience in other countries.

The aim of the Committee is to collate such information in order that comparisons may be made between alternative methods of district heating, regarding the supply of gas from a central works to consumers' premises as a system already in existence and partially developed. Such information, it is hoped, will be of assistance to gas engineers who have to make a comparison of projects contemplated in their own district with the service which they are able to offer. The opinion has been formed that the system of gas supply is likely to give the most complete and flexible service in most residential areas, although in areas where the density of heat demand is high and shows large seasonal variations district heating may find the factors most favourable.

The Committee has noted that the majority of proposals require for economic stability that they shall be given preferential treatment over other systems both financially and by the exclusion or restriction of competition.

The attention of the Committee has been drawn to many examples of district heating which are being considered in connexion with post-war rebuilding schemes, and will be pleased to be informed of any further proposals.

A member of the Committee has prepared an exhaustive memorandum on the subject of centralized heat supply. The memorandum has been circulated to a number of gas engineers for their comments, and the advice of an eminent consulting engineer has been obtained in this connexion. It is hoped in the near future to publish a Report of the Committee containing information derived from the memorandum and the discussions upon it.

Gas Installations Committee

The membership of the Gas Installations Committee is:

R. J. Rogers (*Chairman*); Mrs. G. Abbott; B. J. Bell; H. M. Browne, M.C.; R. D. Keillor; R. N. Le Fevre, A.M.I.Mech.E.; H. P. Lupton, B.Sc., A.R.I.C.; J. M. A. Mitchell; H. Singleton, M.I.Mech.E.; N. S. Smith. *Co-opted:* J. H. Markham, F.R.I.B.A.

As was recorded in the 5th Report of the Chairmen's Technical Committee, the Report of the Gas Installations Committee was published for the Ministry of Works by H.M. Stationery Office as Post-War Building Studies No. 6, and is receiving wide circulation. It is pleasing to report that some of the Junior District Gas Associations have arranged discussions of the Report at meetings of their Associations, which have been well attended and which have created a lively interest in the Report and its recommendations.

Since the publication of the Report it has not been necessary to convene the Committee frequently, but it has met during the year to consider comments which have been submitted upon the Report and other relevant matters. The Committee continues its collaboration with the Ministries of Works and of Fuel and Power, and maintains close contact with other Gas Industry Committees dealing with the utilization of gas and with problems connected with post-war planning.

Gas-Works Safety Rules Committee

The membership of the Gas-Works Safety Rules Committee is:

F. M. Birks, C.B.E., M.I.Mech.E. (*Chairman*); J. E. Davis, F.R.I.C.; G. Le B. Diamond, M.I.Mech.E.; Thomas Hardie, M.Inst.C.E.; L. Hartley, M.I.Mech.E.; H. Hollings, D.Sc., F.R.I.C.; D. D. Melvin; G. C. Pearson, M.Inst.C.E.; T. F. E. Rhead, M.Sc., F.R.I.C.; C. S. Shapley, M.I.Mech.E.; Col. H. C. Smith, C.B.E., D.L., M.Inst.C.E.; E. G. Stewart; the President, the two Vice-Presidents, and the Honorary Secretary of the Institution (*ex-officio*). *Co-opted:* L. F. Stemp, B.A., LL.B.

The resignation from the Committee of Mr. H. E. Bloor, B.Sc., B.Eng. (York), is reported with regret. Mr. Bloor has rendered valuable service to the Committee for a number of years, and the Committee desires to record its appreciation of these services.

The Committee has met during the year, and has continued to collaborate with the appropriate Government Departments in connexion with the application of Section 30 of the Factories Act to benzole and similar stills, camouflage of gasholders, the ventilation of retort houses, &c. It has also been consulted through its Chairman by the Fire Service Department of the Home Office in the preparation of the Chapter on "Town and other Gas and Fires in Gas Undertakings" in the Manual of Firemanship.

The Committee has been in correspondence with the Accident Prevention Committee of the American Gas Association in matters relating to safety at gas-works generally, and the Committee has had the opportunity, through the courtesy of the American Gas Association, of studying Interim Bulletins Nos. 1 to 44 and 2 to 44 published by the Accident Committee, dealing with Prevention of Fatal Injuries during 1943 and with Explanations of Unusual Fires or Explosions during 1940–43 in the American Gas Industry.

The causes of the outbreak of fire in the purifiers in two Undertakings have been examined by the Committee, and consideration has been given to an explosion which occurred in an electro-detarrer at another undertaking. In connexion with the latter the Committee recommends that a warning notice be fixed to the starting panel of electro-detarrers stating that the detarrer must not be put into commission or switched on until the engineer in charge is satisfied that there is no possible risk of an air-gas mixture being present in the gas stream.

The Committee is giving consideration to damage to gas-works plant through leakage of electricity from electrical apparatus, examples of which have been brought to its notice.

A Note on the possibility of explosive atmospheres existing in ammoniacal liquor wells on gas-works was prepared by the Committee, and sent to all gas undertakings on Dec. 28, 1944. It is reproduced below.

"*Possibility of Explosive Atmospheres in Ammoniacal Liquor Wells in Gas-Works.*

"For some time the Gas-Works Safety Rules Committee of the Institution of Gas Engineers has had under consideration the circumstances surrounding an explosion due to the presence of an explosive mixture in a liquor well. An examination has been made of the atmosphere in a number of ammoniacal liquor storage tanks on gas-works and in a selection of seal pots on the liquor lines to the tanks.

"Significant quantities of gas were found only when seal pots having certain features which now appear to be undesirable were employed. As it is important to have a seal pot of suitable design wherever liquor that has been in contact with gas is admitted to a storage vessel, a design which appears to be free from objection has been prepared by the Committee.

"It may be recorded that the proportions of the various combustible constituents found in the atmospheres of several tanks correspond with the composition of coal gas rather than with the relative solubilities and diffusivities. The combustible gas appears to be brought into the tank (*a*) by the carry-over of small bubbles of gas by liquor in the seal pots, particularly in those with a small cross-sectional area and submerged run-off, or (*b*) by the periodic syphoning of gas owing to tightly-fitting seal pot covers.

"In each case where an explosive mixture was found its presence could be explained. The first was a small tank above ground receiving liquor from three rotary washers via seal pots which, for reasons given later, are regarded as unsatisfactory. The second was a tank with tightly fitting cover receiving liquor from washers via seal pots which also had closely fitting unvented lids, and were of the type having an enclosed cleaning plug which may leak and allow gas to pass into the sealed space. The third was the circulating tanks of a washer-cooler, the cover of which had been made tight for a special purpose. After the test the lid was ventilated; subsequent analysis showed no gas in the atmosphere over the liquor.

"The atmospheres in all the other tanks examined had combustible

gas contents ranging from *nil* to 3½%, the mean of all the results being only 1½%.

"In most cases, where the combustible gas was near the higher figure, its presence could be attributed to certain features in the design or condition of the seal pot. From a consideration of all the evidence obtained it appears that there would be no substantial risk of a dangerous quantity of combustible gas reaching the liquor tanks if the seal pots were of correct design and in good condition, and it is suggested that the design should be such that—

"(*a*) it may be readily cleaned;

"(*b*) the volume of gas carried with the liquor shall be a minimum;

"(*c*) any gas carried over unavoidably with the liquor shall be vented to atmosphere before it reaches the storage tank.

"In order that these requirements may be satisfied, the dip-pipe should be provided with cleaning plugs placed outside the pot, the cover of which should be detachable. The internal diameter of the dip-pipe should be at least 2 in. when the maximum flow of liquor is not greater than 200 gall. per hr. This is in order to allow entrained bubbles of gas to rise against the slow downward flow of liquor. The more minute bubbles, sometimes present in the form of froth or foam, have a much lower relative velocity, and will be carried down the dip-pipe into the seal pot. In order to ensure that, as far as possible, these shall be disengaged at the surface of the liquor in the seal pot, the diameter of this should be at least 10 in., and the piping leading from the pot should be so arranged that the liquor runs off at the surface level. The cover of the seal pot should be vented by a hole at least 1 in. in diameter."

Joint Lighting Committee

The membership of the Joint Lighting Committee is:

Institution Nominees: F. C. Smith (*Chairman*); A. Maurice Bell; W. J. G. Davey, B.Sc.; J. E. Davis, F.R.I.C.; Dean Chandler; J. Weatherall Foreman; E. S. Harris; W. Hodkinson; D. D. Melvin; A. R. McGibbon; F. W. Sansom, M.B.E.; D. M. Thompson; C. I. Winstone.

Society of British Gas Industries' Nominees: W. R. Edgar; Colonel C. J. Falk; S. F. Baker; C. H. A. Kempton; R. J. Rogers; H. R. Stevenson; Philip H. Sugg; H. Talbot.

Affiliated District Gas Associations' Nominees: James Dickson (North British); E. Howard (Midland); H. Maycock (Wales and Monmouthshire); H. W. Saville (Irish); H. Singleton, M.I.Mech.E. (Manchester); W. S. Stredwick (Southern); J. E. White (North of England); George Wright (Eastern Counties).

Ex-officio: The President, the two Vice-Presidents and the Honorary Secretary of the Institution.

The death of Mr. George Dixon (Nottingham), recorded earlier in this Report, has been a severe blow to the Joint Lighting Committee, of which he was Chairman for many years. It is with regret also that the retirement from the Committee of Dr. E. V. Evans, O.B.E., F.R.I.C. (London), and Mr. A. L. Holton (Manchester) is reported. Both have served on the Committee since its inception, and the thanks of the Institution are due to them for their assistance for so many years.

The Committee has met during the year to discuss current problems including, *inter alia*, the restoration of street lighting. It has been in constant touch with the Ministries of Home Security and of Fuel and Power in this matter and has circulated several memoranda to gas undertakings giving advice thereon.

The return of street lighting has inevitably been accompanied by the desire of many local authorities to reconsider their street lighting installations, and the Committee has been consulted by many gas undertakings in this regard.

The *ad hoc* Sub-Committee (*Chairman:* Mr. F. C. Smith) appointed by the Joint Lighting Committee "to review and recommend on the future of gas lighting for all purposes" has completed its Report, which has been submitted by the Joint Lighting Committee to the Council. In preparing the Report the Sub-Committee has made a most exhaustive enquiry into every aspect of lighting by gas, and has received evidence from representatives from all parts of the country.

During the year Mr. George Dixon and Dr. E. V. Evans resigned their seats as representatives of the Institution of Gas Engineers on the National Illumination Committee of Great Britain. The vacancies so created have been filled by Mr. A. M. Bell (Tottenham) and Mr. A. G. Higgins (Assistant Secretary).

Liquor Effluents and Ammonia Committee

The membership of the Liquor Effluents and Ammonia Committee is:

C. F. Botley, M.Inst.C.E. (*Chairman*); T. Lewis Bailey, Ph.D., F.R.I.C.; H. T. Calvert, M.B.E., D.Sc., Ph.D., F.R.I.C.; Prof. J. W. Cobb, C.B.E., D.Sc.; W. A. Damon, B.Sc., F.R.I.C.; E. V. Evans, O.B.E., D.Sc., F.R.I.C.; H. Hollings, D.Sc., F.R.I.C.; P. N. Langford; P. G. G. Moon, O.B.E., M.Inst.C.E.; A. Parker, D.Sc., F.R.I.C.; P. Parrish, F.R.I.C.; E. W. Smith, C.B.E., D.Sc.; B. A. Southgate, D.Sc., Ph.D.; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex-officio*). *Co-opted:* L. F. Stemp, B.A., LL.B.

The Committee has continued to meet during the year, and has been asked to assist several undertakings in connexion with problems arising from the disposal of their effluent.

The Committee has to congratulate Dr. A. Key (Research Chemist) upon his appointment as Chemical Inspector to the Ministry of Health, and desires to record its appreciation of his services to the Committee and to the Industry for many years.

The programme of work which was prepared by Dr. Key is being continued by Dr. A. H. Eastwood (Research Chemist), who, with his colleagues at the University of Leeds, is carrying out interesting work with promising results on a number of problems, including the removal of thiocyanate from gas-works liquor, and the problem of its formation in scrubbers.

The condensate from carburetted water gas plant has been examined, and also the crude liquor produced in the experimental hydrogenation plant of the Gas Research Board at Bournemouth.

Meters Committee

The membership of the Meters Committee is:

Institution Nominees: J. T. Haynes, Assoc.M.Inst.C.E. (*Chairman*); C. R. Austen; H. E. Bennet, M.C.; H. W. Hodgson; R. D. Keillor; L. F. McLeod, O.B.E.; W. L. S. Spinks; W. K. Tate, M.A., Assoc.M.Inst.C.E.

Society of British Gas Industries' Nominees: T. C. Braddock; Col. W. R. Glover, C.M.G., D.S.O., T.D.; Norman Smith.

Ex-officio: The President, the two Vice-Presidents and the Honorary Secretary of the Institution; R. J. Rogers (Chairman, Gas Installations Committee).

Several meetings of the Committee have been held during the year at which consideration has been given to matters affecting the design and accuracy of meters, especially in relation to post-war requirements.

Of particular interest in this connexion are the growing interest of the Industry in gas tariffs and its possible further demands for tariff mechanisms, and also a request from the Ministry of Works for the production of smaller gas meters for domestic purposes. These matters are receiving the serious attention of the meter manufacturers, some of whom have already demonstrated examples of tariff mechanisms to the Committee.

Work on the *in situ* testing of meters has been continued, and the Committee has had the opportunity of considering the results obtained by a number of gas undertakings. These results confirm the opinion of the Committee that periodical testing *in situ* is strongly to be recommended.

Investigations are being carried out by members of the Meters Committee, in collaboration with the Gas Research Board, on the provision of suitable alternatives to leather for meter diphragms. Although it is not possible at this stage to formulate any definite conclusions, the investigations are likely to be of great interest.

With regard to the Committee of Enquiry into the Gas Industry (Heyworth Committee) of the Ministry of Fuel and Power, the Meters Committee prepared a Memorandum relating to the work of the Committee, with particular reference to standardization of gas meters, new design of meters, and to the existing procedure for the testing of gas meters. This Memorandum was submitted to the Heyworth Committee by the Council of the Institution.

The Committee has had the opportunity of examining a device which has been invented and patented by the Birmingham Gas Department to eliminate the auto valve from prepayment meters, and thus to overcome difficulties caused by the non-closing of the auto valve.

Pipes Committee

The membership of the Pipes Committee is:

H. J. Escreet, B.Sc.(Eng.), M.Inst.C.E. (*Chairman*); F. Boardman, M.I.Mech.E.; L. F. McLeod, O.B.E.; R. G. Marsh; S. T. S. Musgrove; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex-officio*).

The Pipes Committee has met to consider problems arising from the effect of enemy action upon distribution systems, and to study new developments in distribution practice and in materials available for the manufacture and protection of pipes.

The Committee has under consideration the preparation of a specification for gas surface boxes, which it is hoped will be suitable for adoption by the British Standards Institution as a British Standard Specification.

Collaboration with Government Departments, the British Standards Institution and other professional Institutions has been maintained. The Chairman of the Committee is serving as the representative of the Institution of Gas Engineers on a Joint Committee of the Institutions of Civil and Municipal and County Engineers to consider the preparation of Notes for Engineers on the Location of Underground Services.

The work of the Sub-Committee on the Corrosion of Buried Metals of the Corrosion Committee of the Institution of Civil Engineers is being closely followed.

Other matters including, *inter alia*, the use of copper for service pipes, the availability of wrought iron for service pipes in the post-war years and the internal use of bitumen or soft tar paints in mains and services have been referred to the Committee and have been dealt with by correspondence.

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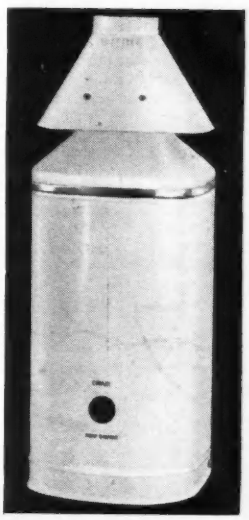

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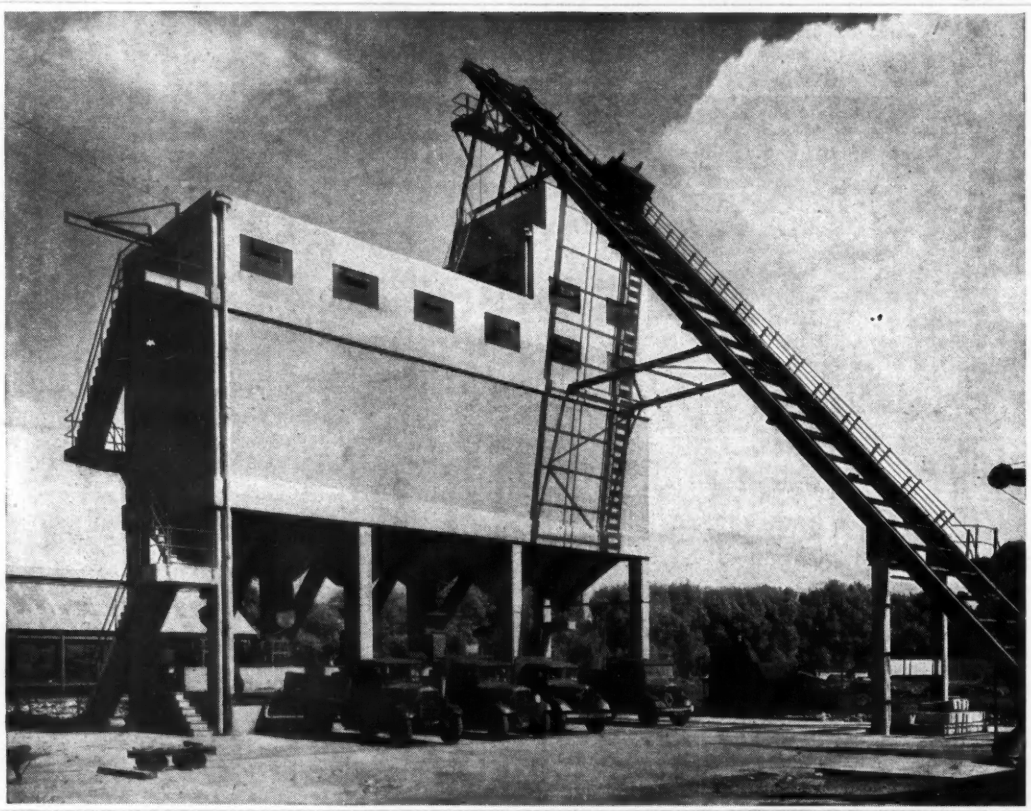

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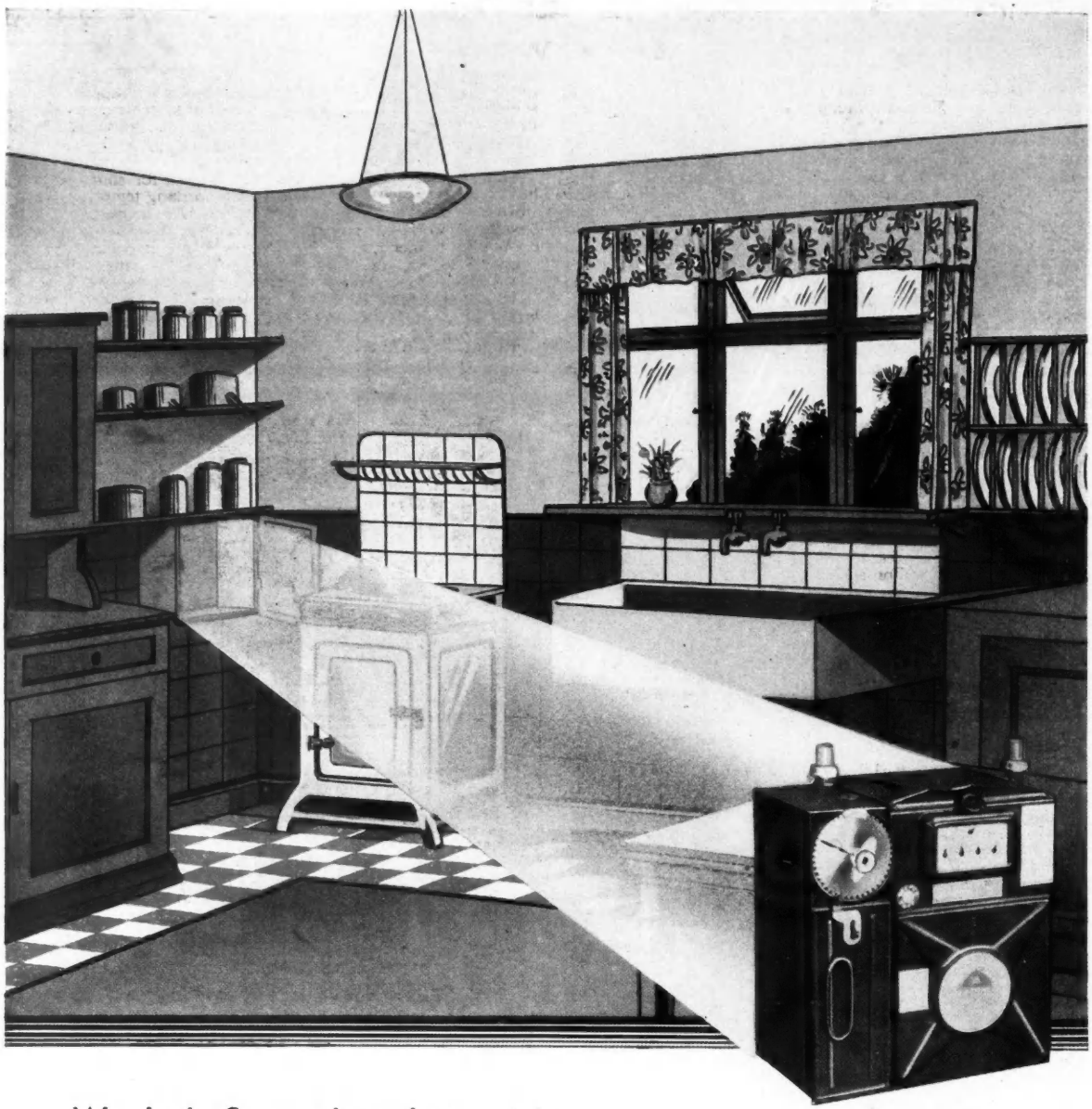

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Industrial Applications of the Non-Aerated Gas Flame*

By J. F. WAIGHT

IF the gas-fired industrial equipment installed in South London factories can be regarded as representative of the whole country, then it is true to say that the bulk of gas burners used in industry employ either partial or complete primary aeration. Pre-aerated gas burners are, of course, eminently suitable for many industrial processes, and have a long record of reliable service to justify their employment, but it is somewhat surprising that, apart from some notable exceptions, the advantages of "neat" gas flames have not been more fully recognized, and their use in gas-fired industrial equipment is not more widespread. The makers of water heating and steam raising equipment have for many years appreciated the advantages of this type of burner, and in consequence a very large proportion of the standard gas-fired boiler apparatus is equipped with them.

It is the intention of the Author, however, to discuss, not well-established standard equipment, but apparatus which has been made to meet particular requirements. The initial cost of such apparatus often can be reduced by the use of neat gas burners, since, speaking generally, these burners can be very simply constructed. Some idea of comparative costs of burner equipment may be gained when it is realized that with town gas at 1 in. water column pressure, 1 sq.in. of neat gas burner port will pass 1,000,000 B.Th.U. per hour, whereas for the same duty, a low-pressure bunsen burner would have to be provided with ports having a total area of about 33 sq.in. In addition any gas combustion system, other than that under discussion, or the low-pressure bunsen system, requires compressors, fans, or other auxiliary equipment, and in consequence becomes costly and complex.

From the industrial gas engineer's point of view it is well worth while when designing equipment to consider the use of neat gas flames, not only from the point of view of lower cost, but also bearing in mind that such a flame cannot backfire, and is in consequence ideally suited for use with automatically controlled apparatus.

Neat gas burners may consist of bar or ring manifolds carrying Bray jets, fireclay nozzles, or they may consist only of a length of barrel drilled with holes of a suitable diameter, or even a single orifice. The application of such burners to industrial apparatus does, in the Author's opinion, tend towards a simplification of construction and operation. They have produced operating temperatures which range from that required to warm a workshop to that of molten steel. Various installations operating within this range are described below.

A closed air heater with a tubular heat exchanger is extensively used in South London for space heating and also for drying processes. The burner equipment consists of a number of Bray "00" industrial jets screwed into ¾ in. B.S.P. burner bars. Such an arrangement ensures an even distribution of heat to the tube elements, and it also eliminates all possibility of backfire—a most important consideration, since these heaters are often required to operate for long periods without supervision, control being effected by thermostatic equipment, and by clock-timing devices.

The performance of the heater is illustrated by the following typical figures:

Volume of air per minute passing into heater	1,700 cu.ft./min.
Outlet air temperature	120°F.
Heat transmitted to air	76%
Heat lost in flue gases	19%
Heat by radiation, convection, &c.	5%

Heaters of this type are maintained once a year, and experience has shown that after four years' use the Bray jets may have to be renewed, but this can be done at very small cost.

At the beginning of this Paper it was suggested that neat gas burners can be provided at lower cost, and are smaller than bunsen burners of equivalent capacity. Each burner bar, as has been stated, is made from ¾ in. B.S.P., and is fitted with 13 Bray "00" jets. Under normal working conditions the heat liberated by each bar is 21,000 B.Th.U. per hour, and a simple bunsen burner of equal power would require a total port area of 0.75 sq.in. Assuming that the total port area is 90% of the cross sectional area of the mixture tube, then this cross section would, if it were circular, have an internal diameter of 1 in., making it necessary to employ 1 in. barrel, drilled with 39 $\frac{5}{32}$ in. burner ports. This port diameter has been selected to ensure a reasonable degree of flame stability. It may be stated that such a burner fitted with a suitable air chamber could not be made at less cost than the ¾ in. burner bar fitted with Bray jets.

In one application a 1½-ton tin melting setting operates under close thermostatic control for 24 hours a day. The melter is heated by Bray industrial jets, and it has proved so successful that six other melting pots of the same size are now in use. This was particularly gratifying, since prior to the introduction of the first gas-fired melting pot, the consumer used an electrically heated pot, and eventually this was replaced by a gas-fired one.

In one piece of apparatus Bray jets function well under particularly arduous conditions. This particular appliance is a stove suitable for heating two 2-lb. soldering bits, and heat is supplied by four standard Bray "0" industrial jets. Originally the stove was heated by a low pressure bunsen burner, but the flame did not have sufficient stability over the range of turn-down required, and neat gas burners were employed to overcome the difficulty.

Many stoves of this type have been in use for some years, and little trouble has been experienced. The working temperature of the stove is about 800°C., but in spite of this high temperature the jets have a long working life, replacements being required in some instances about once in three years. The long life of the jets under the rather extreme operating conditions can be attributed to the cooling effect of the relatively heavy cast-iron body into which they are screwed.

The stability and flexibility of the neat gas flame renders it particularly suitable for the infra-red heating panels, which are shown built into an oven in the photograph in fig. 1.

The oven is fitted with 24 radiating panels which are separately controlled. Each panel has an area of 180 sq.in., and a radiated heat output of 4,000 B.Th.U. per hour. The rate of heat transfer from the burning gas to the radiating panel is high, since the flames are allowed to contact the back of the panel. Ten hexagonal-headed Bray jets are used, and these are screwed into a length of ¼-in. barrel. The air supply passes over the barrel and assists in cooling the jets.

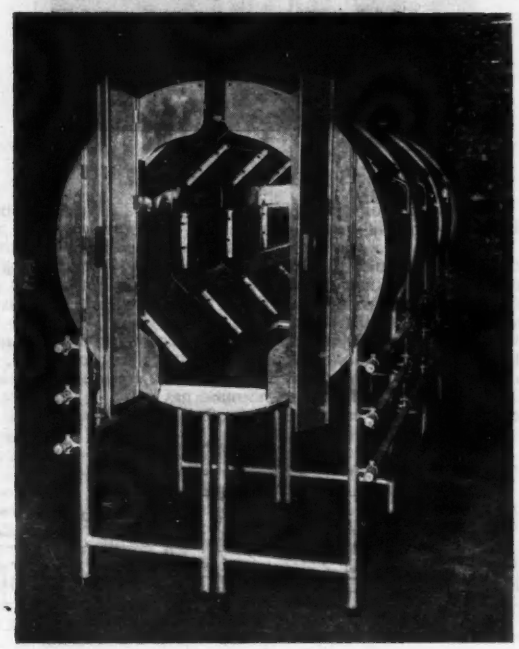

FIG. 1.

When using Bray industrial jets it is most important to bear in mind that overheating will result in damage to the brass casing, and it may cause hydrocarbons in the gas to crack and close up the gas-way. It is therefore very important to keep the jets cool, and in the writer's experience this can be done by screwing the jets into a fairly heavy float with adequate cooling surface. It is also important to remember that for each jet there is a critical pressure above which the flame will lose its characteristic fan shape, and will become ragged and turbulent.

A very simple type of neat gas jet is shown in its essentials in fig. 2. This burner is normally employed for fairly high gas rates, and is of the type which has been so successfully applied to the conversion of side flue bread-baking ovens—a method which was originated by the Gas Light and Coke Company. Since the method was introduced, many side flue ovens in the London area and in other parts of the country have been successfully converted to gas-firing. The burner employed for the conversion consists of a single metal nozzle screwed 1¼ in. B.S.P., and drilled to pass about 4·5 therms per hour at 25-tenths water column pressure. The burner projects flame into the oven space through a small circular opening, and the air for combustion enters the opening under the influence of chimney draught aided by the entraining effect of the gas jet. The burner may be and is used for purposes other than bread baking. For instance, the photograph in fig. 2 shows how it has been adapted to heat a 3-ton lead-melting furnace which was originally oil fired. In this instance

* Paper to the London and Southern District Junior Gas Association.

the burner is controlled by a Cambridge temperature controller. The installation has been in use for some years and has given complete satisfaction. Pot life is extended, and there is less loss of lead as local overheating does not occur. Again, it is worth mentioning that these burners cost less to make and install and are much smaller than bunsen burners of equivalent capacity.

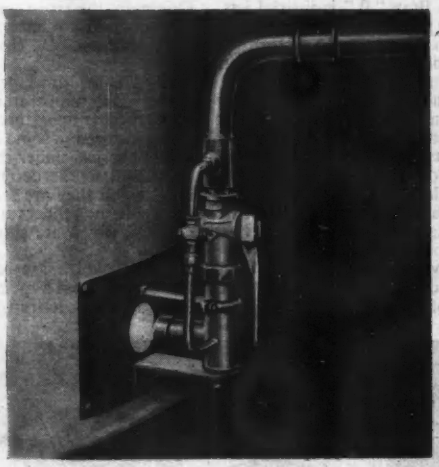

FIG. 2.

A similar method of firing, but using a modified burner, has been fitted to a 12-ton lead-melting furnace. In this burner the gas port area is provided by a number of small holes drilled into a length of barrel, and the resulting flame is projected into the combustion chamber through a narrow rectangular opening. For similar gas rates such a burner has a shorter flame than that of a burner having a single orifice, also the flame is more evenly distributed over the width of the combustion chamber. With this system high gas rates can be handled with ease, and the burner is very easy to control. It is usual to fit these burners with flame failure safety equipment, since such equipment not only closes the main gas valve in the event of flame failure, but also ensures that a safe lighting procedure will be adopted. This latter consideration is most important, and is one which should receive careful attention. The control system is such that thermostatic and clock control can be incorporated to operate on the same relay valve which is employed for the flame failure device. The control system is illustrated in fig. 3.

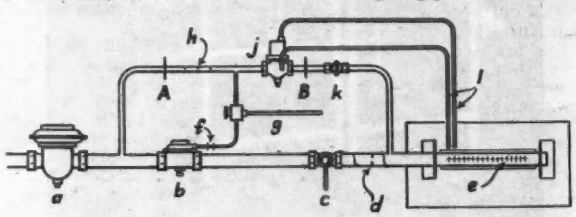

FIG. 3.

The relay valve employed is of the complete shut-off type, and is by-passed by a rider. The controlling gas leak from the relay valve after passing through the thermostat discharges into this rider. The governor is set to control at a pressure which is normally 10-tenths water column above that at which the burner is designed to operate. Orifice plates are inserted in the rider at "*h*" and in the main supply at "*d*." These restrictions reduce the governed pressure to that required by the burner, and provide the pressure difference required to work the relay valve diaphragm. It will be seen that thermostat closure will reduce the gas rate to that which is metered by the orifice at "*h*." A Honeywell Brown Pilotstat and a control cock are fitted into the rider in the positions indicated, and it will be seen that closing the rider cock will also cause pressure to be put upon the top of the relay valve diaphragm, and the whole of the gas will be shut off with the exception of the pilot ignition flame. If the pilotstat valve should close, the latter flame will be turned off as well. The small orifice which is inserted in the relay valve weep pipe, and which is labelled "*f*," serves to reduce the rate of opening of the relay valve, and thereby prevents a sudden inflow of gas to the combustion chamber.

Burners of this type have been fitted to hot water boilers, steam boilers, air heaters and furnaces, and it may be of interest to explain the method of determining the dimensions of the burner for a given duty.

The number of burner ports to be provided will depend on the width of the combustion chamber or upon the width of the opening into the combustion chamber. The diameter of the burner ports can be ascertained from the gas rate required, the gas density, and the pressure at which it is proposed to operate the burner.

The area of the opening through which the flame passes into the combustion chamber must be sufficient to allow the entry of the gas stream and the air for its combustion under the prevailing pressure and draught conditions. To calculate this area it is necessary to know the average velocity of the mixture as it passes through the opening. This velocity will depend upon the draught in the combustion chamber, the velocity of the gas passing through the burner ports, and the weight of gas and air passing in a given time, and it would appear also to depend on the relationship—

$$V = K\frac{(MgVg + MaVa)}{Mg + Ma},$$

where V is the mean velocity of the gas and air stream as it passes through the combustion chamber opening; K is a resistance factor which allows for the shape of the openings; Ma is the mass of air passing in unit time; Mg is the mass of gas passing in unit time; Va is the velocity of the air stream as calculated from the draught within the combustion chamber; Vg is the mean velocity of the divergent gas stream at a plane normal to its direction and coincident with the front of the combustion chamber opening. This velocity is calculated on the assumption that the angle of divergence of the flame is 7°. On this basis Vg may be obtained by multiplying the velocity as calculated from the burner pressure by a flame spread coefficient N, the value of which is dependent on the distance of the burner from the combustion chamber opening.

In fig. 4 the coefficient N is plotted against the relationship L/D,

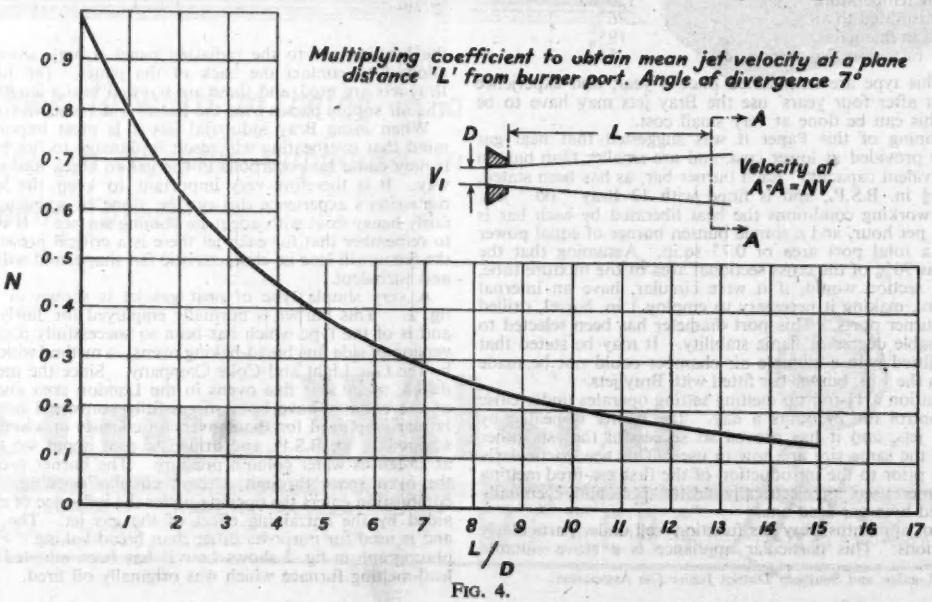

FIG. 4.

where L is the distance between the burner and the front of the opening, and D is the diameter of the burner port.

The value of K has been determined for a number of burners, and appears to be about 0.8 for circular openings, and about 0.7 for narrow rectangular openings.

As an example let us suppose that it is necessary to design a burner capable of passing 1,000 cu.ft. of gas per hour at a pressure of 2 in. water column, with a combustion chamber draught of 0.05 in. water column; it being assumed that gas weighs 0.03 lb. per cu.ft., and that air weighs 0.076 lb. per cu.ft., and also that 5.5 cu.ft. of air will be supplied for every cu.ft. of gas burned,

Mg will be 0.0083 lb. per second
Ma „ 0.116 „ „
Va „ 14.8 ft. „

If the burner is to have only one orifice, then to operate at 2 in. water column its diameter will be 0.675 in., allowing a coefficient of discharge equal to 0.75 in.

If this orifice is mounted 1 in. away from the opening into the combustion space, then L/D will be 1.48 and N from the curve will be 0.72.

Vg is therefore $(64.4 \times 2/12 \times \frac{62.5/}{.03}) \times 0.72)^{1/2} = 107$ ft. per sec.

The mean velocity of the mixture through the opening is therefore—

$$\frac{(0.0083 \times 107 + 0.116 \times 14.8)}{(0.0083 + 0.116)} = 21 \text{ ft. per second.}$$

A circular opening would be used with the single orifice and the mean velocity would be $0.8 \times 21 = 16.8$ f.p.s., while the volume of mixture per second would be 6,500/3,600, or 1.81 cu.ft. per second. A circular opening 4.4 in. diameter would therefore be required. If a shorter flame were required a number of smaller burner ports could be drilled into a length of 2 in. barrel as determined below. The opening into the combustion chamber would then take the form of a narrow rectangular slot of length equal to $p(n + 1)$, where "p" and "n" are the pitch and the number of holes respectively. In the case of the example under consideration, we may assume that the combustion chamber dimensions make it possible to employ a slot length of 12 in. The burner should be mounted approximately 1 in. away from the slot and L/D would have to be recalculated. Twenty-three holes at $\frac{1}{2}$ in. pitch would be used, and for the burner to pass the requisite quantity of gas at 2 in. water column these holes would be drilled $\frac{9}{64}$ in. dia., and N would be 0.29 and Vg would be 43.5 ft. per sec. From this information, and allowing a value of 0.7 for K to cover the loss in a rectangular opening, we find that the area required is 22 sq.in., and in this case a slot measuring 12 in. by 2 in. would be employed.

The bunsen burner would be larger and also more costly to produce.

The efficiency of boilers fired by this type of burner is indicated by the charts in fig. 5. On these graphs the thermal efficiency based on flue loss and the calorific value of the gas is plotted against the heat input to the burner.

Curve A was plotted from readings taken on an Ideal Boiler No. 410—K.0, and curve B was plotted from readings made on a Crane number 2/6 Whitehall Boiler. The small cross lines on each curve indicate the maximum and minimum gas rates at which the boiler operates. The mean thermal efficiency will lie between the limits thus indicated.

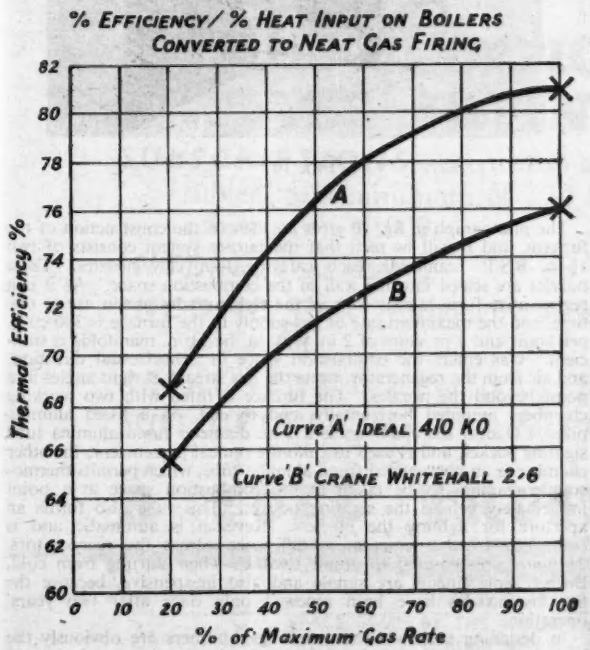

Fig. 5.

The photograph in fig. 6 shows the application of a neat gas burner to a 12-ton lead-melting furnace. The burner on the lead-melting furnace operates at seven-tenths of an inch water column and has a gas rate of 900 cu.ft. per hour. Seven pounds of lead are raised from 80°C. to pouring temperature for every cu.ft. of gas burned.

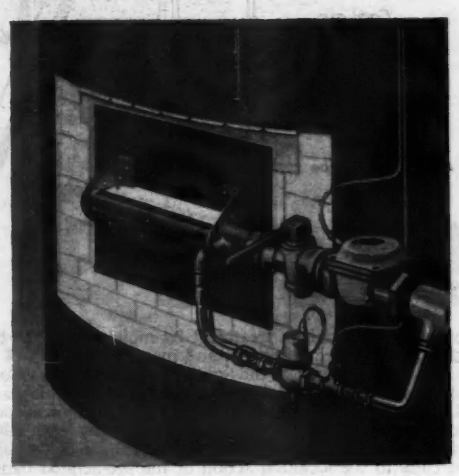

Fig. 6.

The application of neat gas burners to closed type air heaters has already been mentioned, but this method of firing has also been employed for the open type of air heater. When designing closed air heaters, the outer dimensions are dictated by the need to incorporate adequate surface in the heat exchanger. This results in a relatively bulky appliance with a large external heat-losing surface. In the open heater it is not necessary to house heat exchangers, and the outer dimensions may be reduced by increasing the velocity of air flow through the heater. The frontal area of the burner need only be that of a single gas jet, and inexpensive heaters of small size and high output may be constructed on these lines.

The illustration in fig. 7 shows such a heater applied to a three-compartment core-drying oven. The simple construction of the heater is made evident by the diagram in fig. 8. From this diagram it will be seen that the burner projects its flame into a steel tube fitted within the air intake and recirculation duct. The airflow arrangement is such that the cool air in the system is interposed between the combustion tube and the outer heat-losing surfaces, while the area of cross section of the heater does not exceed that of the main ducting. The heat-losing surface is thus reduced to a minimum. The small area of cross section employed implies that a burner with a small frontal area, and a high rate of heat output per unit area of port must be used. This requirement is fulfilled very simply by the single port neat gas burner with which the heater is fitted. The burner passes 3.5 therms per hour at 2.5 in. w.g., and it is equipped with flame failure and thermostatic control apparatus.

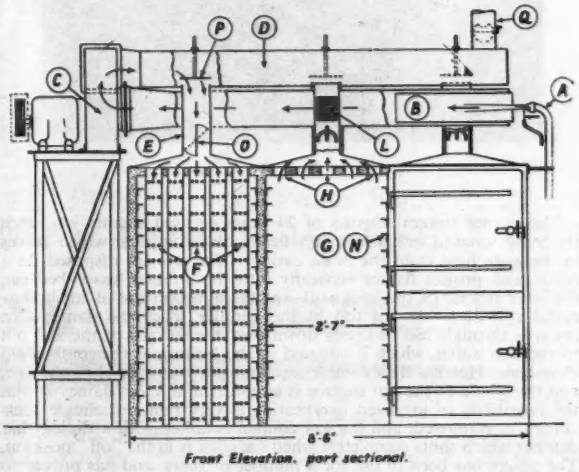

Fig. 7.

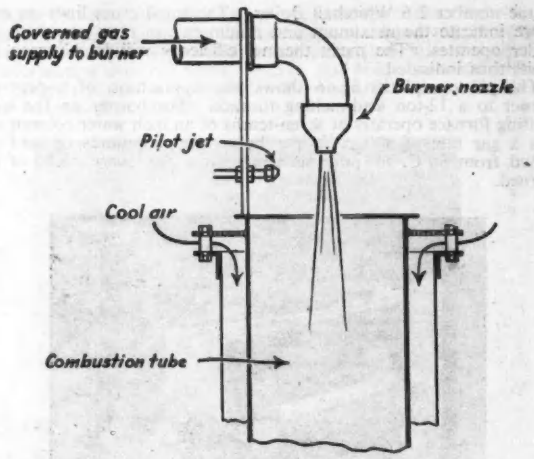

FIG. 8.

In the past few years heat treatment by molten salts has become an essential manufacturing process, and many salt baths are heated by town gas. Some years ago the South Metropolitan Gas Company produced a salt bath heated by neat gas burners. This bath was designed in an endeavour to meet the requirements of a consumer who had become dissatisfied with an existing gas-fired salt bath. The cause of the dissatisfaction was the early failure of the salt pots, due apparently to the localized action of the pre-aerated flame with which the salt bath was heated.

It was to avoid such localized action that neat gas burners were chosen for the new design which is shown in the photograph in fig. 9. The setting accommodates a pot 9 in. diameter by 16 in. deep, and this pot is preferably made from Pireks 60, heat-resisting alloy steel. It is suspended in the setting within a hollow cylinder made from the same metal, and the outer brickwork is built from refractory insulating material.

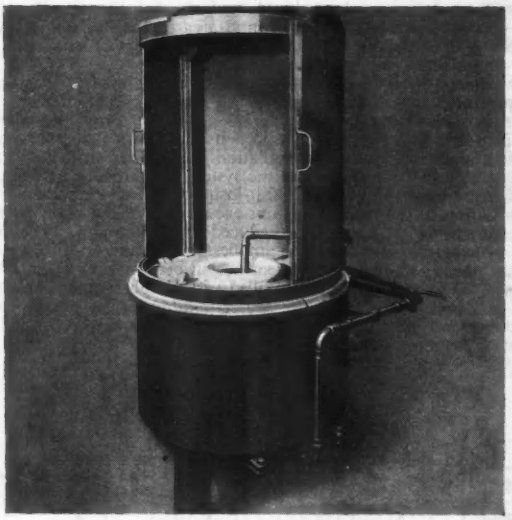

FIG. 9.

The burner system consists of 24 brass encased steatite jets, each jet being screwed into a relatively heavy cast iron pillar which serves to dissipate heat from the brass casing. The jets are disposed on a circle, and project flames vertically into the annular space between the inner surface of the brickwork and the outer surface of the hollow metal cylinder. At the top of the annular space the flames turn inwards through 180°, to pass down over the surface of the salt pot to the flue outlet, which is situated at the bottom of the combustion chamber. Heating thus commences from the upper level of the salt, and the whole of the pot surface is swept by a lambent flame, so that the possibility of localized overheating is very remote. Single cock control is employed, and the gas control is linked with a sliding flue damper which shuts completely when the cock is in the "off" position. The design has been in use for a number of years, and has proved to be economical in the use of pots and in the use of fuel. The maximum rate of heat input is 1.5 therms per hour at 2.5 in. W.G., and the burners, which are almost silent in operation, require very little maintenance.

Neat gas burners are a most useful and flexible means of heating furnaces, and a number of furnaces have been constructed which employ this method of heating. Small furnaces of this type which are heated by a number of steatite jets sealed into a cast-iron manifold are widely used in South London. The layout of the brickwork and the design of the burner make for uniformity of heating, and this, together with the high degree of control conferred by the burner, have made the furnaces very popular.

A furnace has been built which employs the method of firing previously described for sectional boilers. This furnace is 12 ft. long, and was designed for the purpose of annealing silver and alloy silver rods. Eight neat gas burners are used, and these burners fire horizontally beneath the hearth, and a gas rate of 5 therms per hour is handled with ease.

Another furnace fired by neat gas may be of interest since it is designed to operate at 1,650°C. It is a regenerative furnace used in the calibration of pyrometer equipment. It replaced a furnace fired by low pressure gas and fan air, which was only suitable for temperatures up to 1,450°C.

FIG. 10.

The photograph in fig. 10 gives an idea of the construction of the furnace, and it will be seen that the burner system consists of two 1¼-in. B.S.P. manifolds, each carrying four clay nozzles. These nozzles are sealed into the wall of the combustion space. As it is a regenerative furnace only four of the eight nozzles are in use at one time, and the maximum rate of gas supply to the furnace is 380 cu.ft. per hour, and a pressure of 2 in. W.G. in the 1¼ in. manifolds is sufficient. Gas enters the combustion space in a horizontal direction, and air from the regenerator meets the gas stream at right angles at a point beyond the nozzles. The furnace is fitted with two working chambers mounted horizontally, end to end, on a fused alumina pillar. One of the chambers is a 2-in. diameter fused alumina tube sighting pocket, and is used to calibrate optical pyrometers; the other chamber is an open-ended fused alumina tube, which permits thermocouple readings to be taken in the combustion space at a point immediately behind the sighting pocket. This tube also forms an aperture for lighting the burners. Reversal is automatic, and is controlled by the temperature difference across the regenerators. 2½ hours are required to attain 1,650°C. when starting from cold. Burner replacements are simple and also inexpensive, because the fire-clay nozzles have been renewed only once after two years' operation.

In designing such a furnace neat gas burners are obviously the best choice, since the whole of the air for combustion can be passed through the regenerators, and the maximum advantage can be taken

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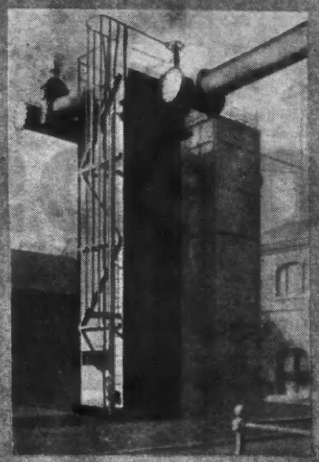
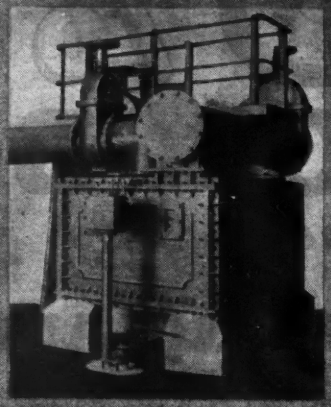
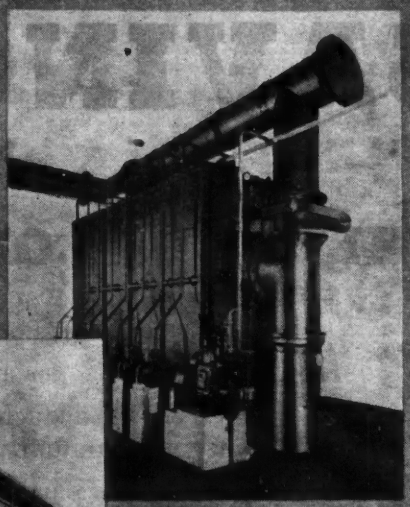

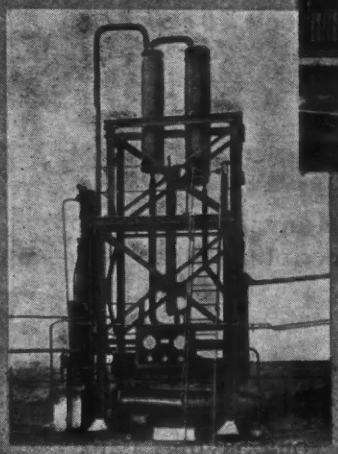
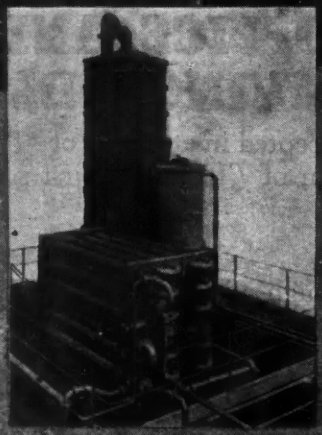
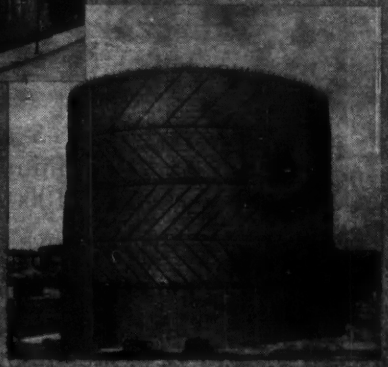

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of the possibilities of preheated air. In the other appliances described in this paper such an obvious consideration does not apply, but in all the instances that have been cited, the employment of bunsen burners would have increased the initial cost of the apparatus and would have resulted in more cumbersome equipment.

Such considerations as these must be weighed carefully by those responsible for the design of equipment for industry. Gas is being sold in a highly competitive market, and the utmost efforts must be made to make the initial cost of efficient plant as low as possible. The ease with which gas can be controlled must be exploited to the full; the apparatus must be constructed so that in its outward appearance it will possess the clean lines which the aesthetic ideas of the age demand. As has been indicated before in this Paper, the pre-aerated burner has a field of use in which it is unsurpassed; there are many examples of gas-fired plant which would have been less costly, easier to handle, and more pleasing to the eye, had they been fired by neat gas burners.

My thanks are due to Dr. E. V. Evans, Director and General Manager of the South Metropolitan Gas Company, for permission to read this Paper, to Mr. Dean Chandler for his help and encouragement in its preparation, to Mr. S. F. Ebdy, who drew the diagrams, and to Associated Motor Cycles, Ltd., Elliott Brothers (London) Ltd., Odeon Theatres Ltd., Walkers Parker and Co., Ltd., for permission to publish photographs.

London Gas Strike

One of the most serious interruptions in London's gas supply in the 135 years' history of the Gas Light and Coke Company occurred as the result of an unofficial strike which began at Beckton and extended to other works in the Company's area on Saturday and ended on Monday night.

In a statement issued on Friday night the Company said: "Recently certain shop stewards approached engineers at two of the works of the Gas Light and Coke Company, stating that unless and until the men were paid time-and-a-third for night work they would carry out only 60% of their normal duties on the night shifts. On and from Monday, Nov. 19, the men have adopted this unjustifiable and unconstitutional course, which is in no way approved or sanctioned by the Trade Unions concerned.

"In the Gas Industry all questions relating to the hourly rates, shift rates, and terms and conditions of employment generally of gas workers are determined by the National and Regional Joint Industrial Councils for the Gas Industry, which are composed equally of representatives of the employers and of the Trade Unions concerned. Increased payment for night shifts has long ago been settled by negotiation with the Trade Unions and was incorporated in the shift rate, with the object of equalizing as far as possible the weekly pay packet. In fact, the shift work differential was further increased by the National Joint Industrial Council in March, 1944.

"The Company, as a member of the Federation of Gas Employers, has at all times faithfully followed the decisions and recommendations of the Joint Industrial Councils, and will continue to do so. In this regard it is to be noted that the National Joint Industrial Council at a meeting held on Oct. 18 last agreed to meet in full an application from the Trade Union side for an increase in wages. Furthermore, the National Joint Industrial Council has set up a special committee comprehensively to review all terms and conditions of employment of gas workers, and it is hoped that this committee will be able to present a report to the full Council in the course of a few weeks.

"The action of the men has already brought about a curtailment of the supply of gas and, if continued, would not only mean a further curtailment, but would in a short period of time involve a complete failure of the gas supply. The Company is deeply sensible of its obligations to the public, and wishes to make it clear that it will not tolerate the action now being taken by the men. Notices have therefore been posted on the works to the effect that unless the men undertake to carry out their normal duties to the full, they will be dismissed from the service of the Company for misconduct."

A demand was made that the notices threatening dismissal should be withdrawn. This was refused, and on Saturday 1,000 men, including about 800 at Beckton, 100 at Bromley-by-Bow, and 50 at Bow Common came out on strike, with the result that the Company's total output of gas was reduced to about half the normal. To conserve supplies for essential purposes, public gas lighting throughout the Company's area was immediately suspended, about 40,000 lamps being extinguished, with the result that black-out conditions reminiscent of the war years were imposed. Consumers were asked to assist in conserving supplies for cooking by not using water heaters, radiators and gas fires, and a general caution was issued about the danger of leaving gas taps turned on. A warning was also issued to factories with mechanical plant such as compressors and boosters which could draw gas from the street mains that such equipment must be turned off and not restarted until the Company announced that it was safe to do so.

The strikers held a meeting on Saturday night and decided that they would resume work to the extent of 60% of their normal night shift work if the threat of dismissal was withdrawn, and would afterwards resume full work as soon as they were satisfied that the National Union of General and Municipal Workers had begun negotiations on the claim for payment of time-and-a-third rates for night work. This suggestion was rejected by Mr. C. Dukes, General Secretary of the Union, who pointed out that the men knew quite well that the night shift rate policy was settled long ago, and that the night men were compensated in the shift rate for the inconvenience of night work. The rate, he explained, was equalized over each three weeks' cycle of duty, so that the men took home the same pay packet every week, and not a heavier one in one week and a lighter one in the other two weeks.

There was a further meeting of the strikers on Sunday night, at which a resolution was passed demanding the withdrawal of the letter from the Gas Light and Coke Company to each man which they considered hinted at victimization, a speed-up in wage negotiations to secure a settlement within 14 days, and a fair statement of their case to the Press. Subject to these demands being met, the strikers intimated that they were willing to resume work on a full normal basis. The meeting was called by the shop stewards, who undertook to submit the resolution on Monday to officials of the National Union of General and Municipal Workers.

The strikers were led by the Gas Industrial Union, which is not affiliated to the Trade Union Congress and is not recognized by the National Joint Industrial Council for purposes of negotiation. In a statement addressed to the strikers, Mr. Dukes, whose Union is one of the three officially recognized by the Industry, said: "We have an obligation to the community to see that the supplies of gas are maintained. It is unwarrantable to imperil the supplies of gas, and is fraught with serious consequences likely to result in impairing plant, which would affect output for a considerable period. By this act the men have rendered themselves liable to prosecution for breach of contract in circumstances in which their attitude is entirely indefensible. Those responsible for so ill-advised a course carry grave responsibilities in this matter. We strongly advise the men to return to work, and to give assurance that they will resume full employment, and that there will be no recurrence of this attempt to coerce those responsible for negotiations."

The end of the strike was announced at 9 o'clock on Monday evening. The decision to return to work was taken unanimously at a mass meeting that night, when the men heard reports from the shop stewards on discussions with the Union officials and the employers. At the same time the Gas Light and Coke Company issued the following announcement:

"The members of the National Joint Council for the Gas Industry met this afternoon, Nov. 26, to receive a report of a meeting of the men held this morning, attended by district officials of the trade unions concerned. The report was considered at length by members of the National Joint Industrial Council, and a decision was arrived at that upon the men resuming full normal work a guarantee is given that there will be no victimization in respect of their conditions of employment in the company. The Council have consulted the Governor of the Company, Mr. A. E. Sylvester, who has agreed that there will be no loss of co-partnership.

"The notices which were handed to the men will become inoperative upon the men resuming full normal work. With regard to the negotiations relating to terms and conditions of employment in the Gas Industry, the adjourned meeting of the special joint committee is being held on Friday, Nov. 30. At this meeting it is hoped that it will be possible for the joint committee to present their report and recommendations for the consideration of the National Joint Industrial Council, in which case a meeting of that Council will be summoned without delay. In accordance with the wishes of the men an explanatory statement will be issued to the Press by the Union."

"Other People's Jobs"

A novel exhibition designed to impress upon the public the continuing need for the elimination of waste of fuel, under the title of "Other People's Jobs," was opened by Mr. E. Shinwell, Minister of Fuel and Power, at the Army and Navy Stores, London, on Nov. 14. Arranged by the Ministry of Information for the Ministry of Fuel and Power, the exhibition illustrated the many and important ways in which "other people's jobs," those of the farmer, the mill worker, the nurse, and so on, and especially the housewife, depend on coal and its products. Working models demonstrated the percentages of fuel utilized by the principal industries, and the Gas Industry showed up well in regard to the economy of the gas-making process, the uses to which gas is applied, and the value of its by-products. The British Gas Council and the Gas Light and Coke Company were responsible for the gas display.

Mr. Shinwell, in opening the exhibition, said he had made his appeal to the mineworkers, the managements at the pits, and the fuel technicians, and had been assured of cordial co-operation. Now he made his appeal to the consumers of fuel and power to eliminate waste. If the response was effective we should come through this winter with a minimum of trouble and discomfort.

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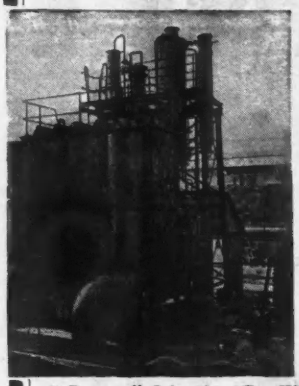

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Products Prices—Stocks and Shares

The London Market Nov. 26.

The only changes in prices of Coal Tar Products are as follows:—

(1) Pitch for briquetting has been increased by 10s. per ton, making the price 70s. per ton f.o.r. at Suppliers' Works.

(2) The price to be paid to producers for Creosote/Pitch Mixture has been raised by 5s. per ton.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the maximum price of Pitch for briquetting has been increased to 60s. per ton f.o.r. supplying works, and the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S R. & O. No. 1528, have been increased by one half-penny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944 No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Nov. 26.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6½d., pure, 3s. 2½d. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Nov. 24.

Market is active for both home and export. Refined tar*: Yield to distillers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality, 5¼d. to 6¼d.; hydrogenation oil,* 5¼d.; low gravity or virgin oil,† 7¼d. to 7¾d.; benzole absorbing oil,* 6¼d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 10d., and 90/190 Heavy naphtha, Unrectified, 2s. 0½d.; Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

*. Price controlled. † Uncontrolled.

There was a fair amount of activity in markets at the opening last week, and a number of bright features were noticeable among industrials. The Government's nationalization programme announcement had little effect on the general position, except in the case of certain groups concerned, and although at the close the turnover was smaller, the tone remained firm.

The volume of business among Gas Stocks and Shares was not on a large scale, and price changes were small and few in number. The nationalization statement referred to above led to some weakness, and Gas Light units closed 1s. lower, while South-Eastern Gas Corporation Stock also weakened slightly. On the other hand, Commercial ordinary, on which no dividend has been paid since June, 1940, went ahead again with a rise of 3 to 68½.

The following were the changes:

OFFICIAL LIST

Commercial Ord.	66—71	+3
Gas Light Units	21/9—22/9	—1/—
Imperial Continental Ord.	116—119	—2
Liverpool Ord.	120—125	—1
South-Eastern Gas Corporation Ord.	20/6—21/6	—/3d.
South Metropolitan Ord.	92—95	—½
Ditto 6 p.c. Pref.	123—128	—1
United Kingdom Gas Corporation 4½ p.c. 1st Cum. Pref.	21/6—22/6	—/3d.

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Bristol 5 p.c. max.	118—120	+½

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Gas Cookers, Fires, Radiators, etc.
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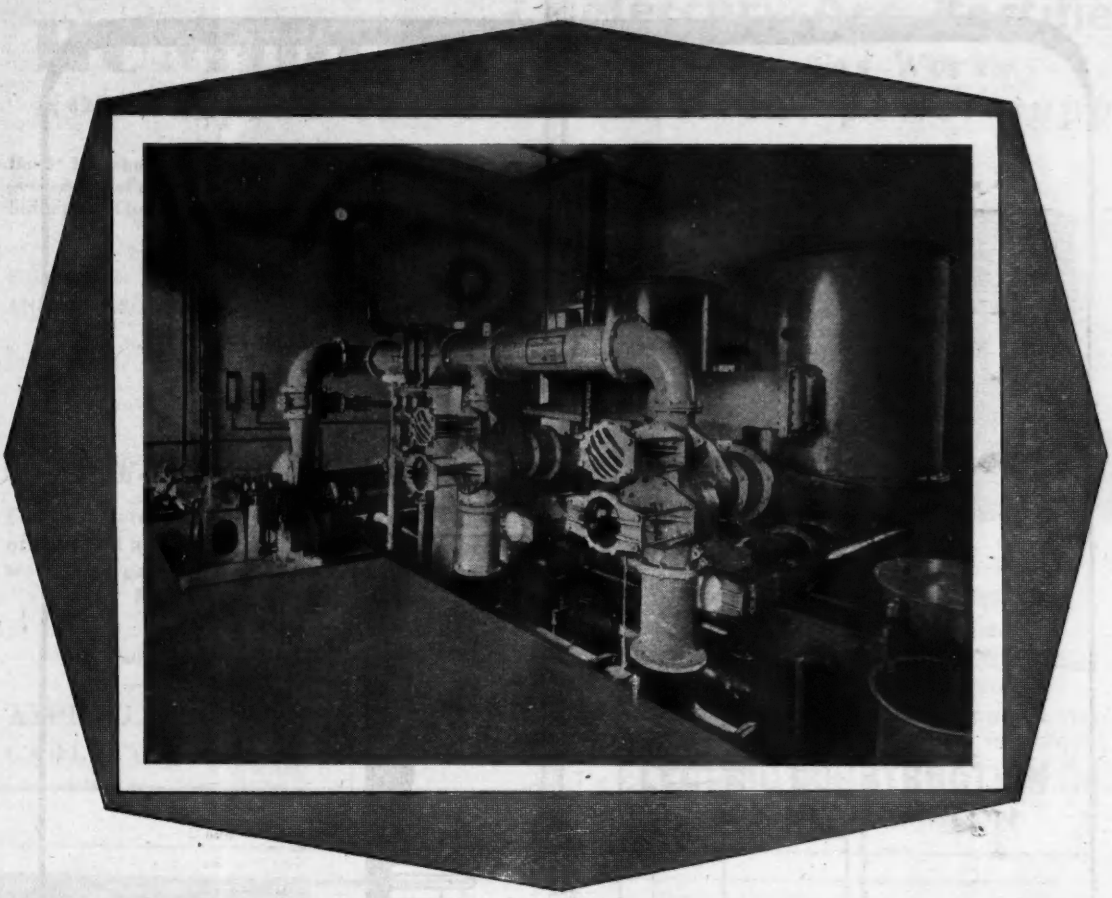

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They are the result of over 20 years' experience in the manufacture and use of Active Carbon for recovery purposes in every branch of industry where solvents are used. They range in size from a capacity of quarter of a million cu. ft. per day, up to 86 million cu. ft. per day, recovering millions of gallons of valuable solvent per annum, which would otherwise have gone to waste.

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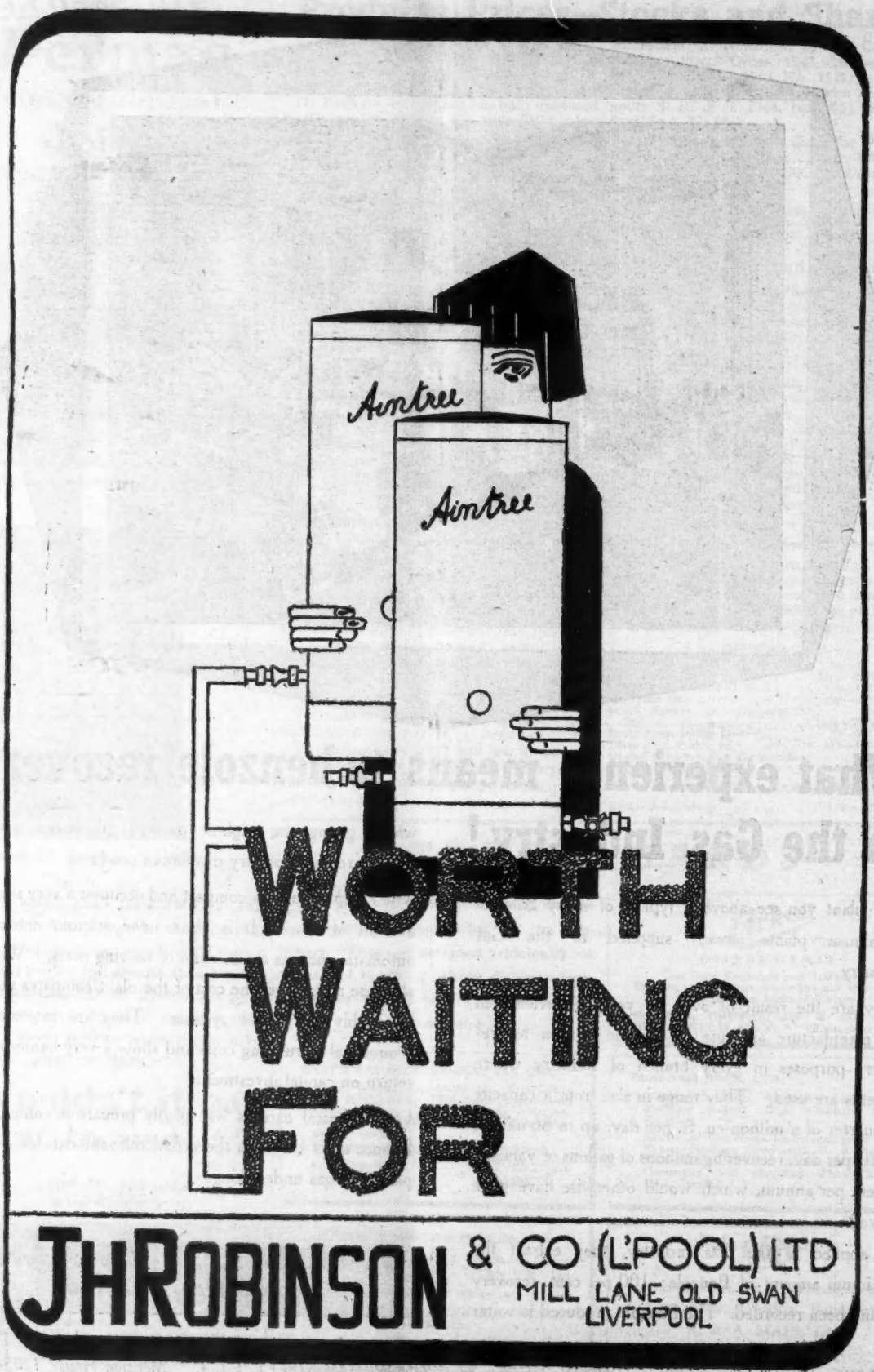
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Mercury-Arc Rectifiers
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four-bulb Electric-Construction Mercury-Arc Rectifier
Input: 400 volts, three-phase 50 periods
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Sets like a ROCK under heat
ONX 'SUPER 85' BRAND for RETORTS
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PRESSURE DIECASTINGS
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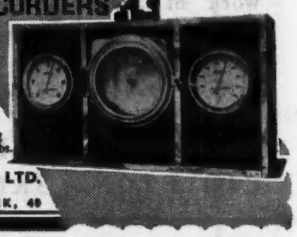

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BREATHING APPARATUS OF ALL PATTERNS
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Everything for Gas and Waterworks Maintenance
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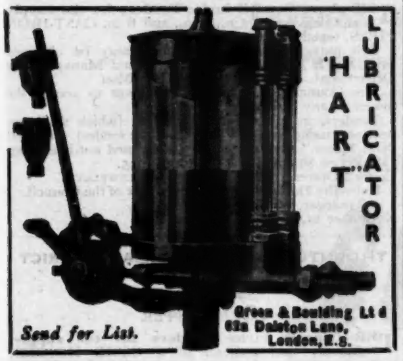

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Both Government and Industry announce and emphasize that young men with technical knowledge and qualifications are to have every chance of rising to the highest posts within their capacity in post-war engineering and allied industry.

Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives the regulations governing qualifications such as A.M.I.Gas E., A.M.I.Chem.E., A.M.Inst.C.E., A.M.I.Mech.E. A.M.I.E.E., C. & G., etc., and contains the widest choice of engineering courses in the world; the Department of Fuel and Chemical Technology covers Gas Supply, Gas Engineering, Gas Power, Chemical Processes, etc. The T.I.G.B. guarantees training until successful and Home-study students of the T.I.G.B. have gained 44 FIRST PLACES in the examinations of the major engineering institutions.

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ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. *Telegrams:* "Dempster, Elland." *Telephone:* Elland 2241, 2242 and 2243.

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FOR SALE.—24 ft. by 9 ft. and 17 ft. by 6 ft. Cylindrical Tanks; Thompson Lancashire Boiler 24 ft. by 7 ft., 120 lb.; 34 kw. Browett 220 volt Steam Generating Set; Weir Feed Pump 8¼ in. by 6 in. by 18 in.; Tangye 3-Throw Hydraulic Pump 3½ in. by 6 in.; Receiver 30 ft. by 7 ft. dia., dish ends ½ in. plate.
HARRY H. GARDAM & CO., LTD., STAINES.

FOR DISPOSAL.—A quantity of surplus gas-works plant, including steam engines, gas engines, electric motors, compressors, governors, retort mouthpieces, washers and scrubbers, &c., also cast-iron pipe specials. List on application to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

FOR SALE.—ROTARY EXHAUSTER with reciprocating steam engine, governor, and valves. 6-in. connexions. Apply to The Manager, Gas Works, Skegness. 'Phone No. 25.

(Classified Advertisements continued on p. 780)

APPOINTMENTS WANTED

APPOINTMENT required as ENGINEER AND GENERAL MANAGER with Gas Undertaking of repute. Fully qualified Engineer, A.M.I.Mech.E. 20 years' managerial experience.

Those interested kindly communicate with No. 9494, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

THE CROYDON GAS COMPANY

ASSISTANT SECRETARY

APPLICATIONS are invited from fully qualified secretaries and accountants, aged 30/35 years, for the post of ASSISTANT SECRETARY.

Knowledge of The Companies Clauses Acts, general secretarial duties, accounting, taxation and rating of public utility Companies is essential, and a knowledge of the law relating to gas is also desirable.

The commencing Salary will be £750 per annum, including war bonus.

The successful candidate, who will be required to pass a medical examination, will be admitted to the Company's Co-partnership Scheme and contributory Pension, Widows' and Orphans' Fund.

Applications, marked "Assistant Secretary," giving details of Education, Professional Training and Experience and the names of two persons to whom requests for Testimonials may be made, should be received at the offices of the Company not later than December 11, 1945.

Katharine Street, Croydon. W. H. HADDLETON, Secretary.

TECHNICAL ASSISTANTS

APPLICATIONS are invited to fill two vacancies on the Service/Sales Staff of a Firm of Contractors to the Gas and allied Industries. Applicants must have good knowledge of Carbonizing and Mechanical Handling, and experience in plant, installation and maintenance would be an advantage.

Salary according to Age, Experience and Professional Qualifications.

Apply to No. 9502, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

COMPETENT CHEMIST required for Coal Testing in Gas-Works Laboratory. Preference given to person having had similar experience. Good prospects of advancement. Salary £350 per annum, inclusive. Applicants should submit full details of training and experience to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

SOUTH SUBURBAN GAS COMPANY

APPLICATIONS are invited for the Position of ASSISTANT CHEMIST at a Salary (exclusive of War Bonus—approximately £80) of £400.

Gas-works' experience and a science degree are advantageous.

Applications, addressed to the undersigned, should be accompanied by Testimonials, education, training and experience, to be received not later than December 15, 1945.

South Suburban Gas Company, Lower Sydenham, S.E. 26. V. SIMMONDS, Engineer.

BLACKSMITH required for a gas-works in the Home Counties. Wages minimum 2s. 0¼d. per hour according to ability. Apply, stating Age, Training, and Experience to No. 9499, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

EXHAUSTER ATTENDANT AND BOILERMAN required on a gas-works in the Home Counties. Wages for seven 8-hour shifts, £6 10s. per week, including War Bonus. Apply, stating Age, Training and Experience to No. 9500, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

MACHINIST required for lathework, &c., in the machine shop of a gas-works in the Home Counties. Wages minimum 2s. 0¼d. per hour or according to ability.

Apply, stating Age, Training and Experience to No. 9501, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

MECHANICAL PLANT FITTER required on a gas-works in the Home Counties for general repairs to steam engines and turbines, exhausters, pumps, compressors, &c. Applicant should be an experienced machinist. Wages 2s. 2¼d. per hour minimum, or according to ability. Apply, stating Age, Training and Experience to No. 9498, "GAS JOURNAL," 11, Bolt Court, Fleet Street E.C. 4.

APPLICATIONS are invited for the Position of WORKS FOREMAN. Preference will be given to applicant with knowledge of Horizontal Retorts and electrically-driven charging machinery. Wages will be paid at the rate of £4 10s. per week, plus War Bonus, now £1 3s., with house, coal and gas free.

Applications, stating Age, Experience and present position in relation to Essential Works Order, enclosing *copies* of recent Testimonials, should be addressed to the undersigned not later than December 1, 1945.

Gas-Works, Saltisford, Warwick. W. H. REED, Engineer and Manager.

WELL-KNOWN Firm of By-product and Chemical Engineers have a vacancy for a JUNIOR TECHNICAL ASSISTANT in specialized department. Preference to man with previous experience on Gas or Coke-Oven Works. Some knowledge of electricity an advantage. Reply in first instance to No. 9504, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C.4, giving Age, Experience and Salary required.

TEIGNMOUTH URBAN DISTRICT COUNCIL

(GAS DEPARTMENT)

TECHNICAL ASSISTANT

APPLICATIONS are invited for the above Position at a commencing Salary of £300 per annum, plus War Bonus, at present £59 10s.

Candidates should be capable of carrying out all the usual routine works tests, and experience with Horizontal Retorts, Water Gas and Benzole Recovery will be an advantage.

The appointment will be subject to the Local Government Superannuation Act (1937), and the successful candidate will be required to pass a medical examination.

Applications, giving details of experience and qualifications, together with *copies* of three recent Testimonials, to reach the undersigned not later than Saturday, December 15, 1945.

Gas Department, Teighmouth, Devon. R. MASON, Engineer and Manager.

November 7, 1945.

(The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. A 9 (C).)

ATHERTON URBAN DISTRICT COUNCIL

(GAS AND WATER DEPARTMENT)

APPLICATIONS are invited for the Position of TECHNICAL ASSISTANT in the above Undertaking.

Candidates should be experienced in carbonizing in horizontal retorts, Benzole Recovery, the usual routine tests and drawing office work.

The salary £285 per annum, increasing by annual increments of £15 to £315 per annum, plus war bonus at present £59 16s. per annum.

The appointment will be determinable by one month's notice on either side and subject to the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, stating age, experience and qualifications, and endorsed "Technical Assistant," together with *copies* of three recent Testimonials, should reach the undersigned not later than first post on December 17, 1945.

Canvassing, directly or indirectly, will be a disqualification, and candidates must disclose whether they are related to any member or senior officer of the Council.

Town Hall, Atherton, Manchester. W. BALSON, Clerk of the Council.

November 20, 1945.

SEVERN VALLEY GAS CORPORATION, LTD.

CHEMIST

APPLICATIONS are invited for the above Position at a Salary of £330 per annum (inclusive of War Bonus).

Applicants must possess recognized Technical qualifications and have received practical Gas-Works training.

Applications, addressed to the undersigned, should be received not later than December 1, 1945, and should be accompanied by *copies* of Testimonials.

Gas-Works, Cheltenham. R. S. SNELLING, General Manager.

WINDERMERE URBAN DISTRICT COUNCIL

APPLICATIONS are invited for the Position of GAS-WORKS FOREMAN at the works of the above Council at a weekly wage of £6 10s. inclusive of War Bonus.

Applicants must have a sound knowledge and practical experience in continuous Vertical Retorts, Waste Heat Boiler and Ancillary Plant. The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applications endorsed "Gas Works Foreman," stating position under National Service Acts and Essential Works (General Provisions) Order and giving full particulars of Age, Training, Experience and Qualifications, accompanied by *copies* of Two Testimonials, must be received by the undersigned not later than first post, Monday, December 10, 1945.

Gas and Water Department, Lake Road, Windermere. J. N. LECKIE, Engineer and Manager.

CHIEF ENGINEER and Plant Manager wanted for large Gas Company in NEW ZEALAND. About 40 years of age, with good knowledge Glover West Continuous Verticals and chemical by-products. Apply in first instance to: J. C. Andrews, c/o Amalgamated Dairies, Ltd., St. Olaf House, Tooley Street, London, S.E.1.

FOREMAN Gas Fitter for Contractor to North London Gas Company. Must have experience of modern Water Heating Appliances, Lead and Copper fitting. Wages 2s. 6d. per hour. Write No. 9505, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C.4.

APPLICATIONS are invited for the Position of ASSISTANT DISTRIBUTION ENGINEER to the Hampton Court Gas Company; at a commencing salary of £400 per annum. Candidates should possess the Institution of Gas Engineers' Certificate in Gas Supply, or its equivalent, and must be experienced in all branches of Gas Distribution.

Applications, stating Age, Qualifications, and Experience, together with a *copy* of a recent Testimonial, should be forwarded to the undersigned not later than December 15.—C. T. Price, Engineer and General Manager, Gas-Works, Hampton Wick, Kingston-on-Thames.

CONTRACTS OPEN

TREDEGAR URBAN DISTRICT COUNCIL

GAS MAINS

THE above Council invite Tenders for the supply and delivery of 3 in., 4 in., and 6 in. CAST-IRON PIPES, together with various specials.

Full particulars and specification may be obtained from Mr. S. L. Filer, Gas Engineer and Manager, Gas Department, Poplar Road, Tredegar, Mon.

The Council do not bind themselves to accept the lowest or any tender.

Tenders, in plain sealed envelopes (which shall not bear any name or mark indicating the sender), endorsed "Gas Mains," must reach the undersigned not later than 12 noon on Saturday, December 8, 1945.

Council Offices, Bedwellty House, Tredegar, Mon. OLIVER LLEWELLYN, Clerk of the Council.

November 21, 1945.

THORNTON CLEVELEYS URBAN DISTRICT COUNCIL

(GAS DEPARTMENT)

COKE HOPPER

THE Council invite Tenders for the supply, delivery and erection of a COKE HOPPER, having a capacity of 20 tons, constructed of steel frame with brick panelling. Drawing and specification can be obtained from the Engineer and Manager, Gas Works, Butts Road, Thornton, Blackpool. Sealed Tenders (which shall not bear any name or mark indicating the sender) endorsed "Coke Hopper" must reach the undersigned not later than Saturday, December 15, 1945.

The Council do not bind themselves to accept the lowest or any Tender.

Council Offices Fleetwood Road, Thornton, Blackpool. J. RONALD WYLDE, Clerk of the Council.

November 19, 1945.

Get in on the Under Belly of RUST (Engineers' Enemy No1.)
Years of Wear instead of Weeks
GRANT & WEST LTD
'PHONE NORTH 2160
Steel Wires, Ropes & Cables running in and out of Water, Gas, Sulphurous Fumes etc. will never RUST if treated with
ROPRES
IT KILLS RUST
STAYS on every STRAND.
RUST KILLS ROPES — but ROPRES rope preservative KILLS RUST. Use ROPRES
Try a Tin on our Guarantee
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'GRAMS "SELEKJOINA, HOLWAY, LONDON"

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ELECTRICAL DETARRERS

82

Precipitation Plants in operation or under construction.

These include over

60

"Holmes-Elex" Patent Electrical Detarrers

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of design and construction are a distinguishing feature of all Holmes' products. This is again evident from the efficient operation of "Holmes-Elex" Precipitators.

PARALLEL PLATE PRECIPITATION ELECTRODES
are the basis of construction of all our plants since the first one built in 1935.
This principle is now being generally adopted as the most satisfactory construction from all points of view.

Our latest design electrical equipment is of the combined all static type enclosed in a single steel tank, completely safe and foolproof, no other screenwork of any kind being necessary, and the equipment can, therefore, be placed in any existing house available.

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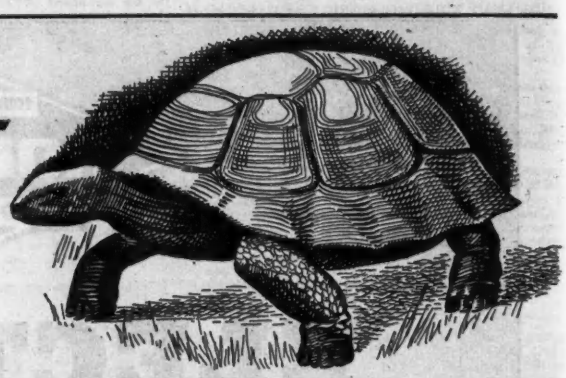

THE TORTOISE.—*The land variety of the Turtle, from the Old French tortis—twisted. Of the order of reptiles CHELONIA: toothless reptiles with well-developed limbs and with dorsal and ventral shell composed of numerous bony plates.*

The tortoise is lucky indeed in that nature has provided him with adequate protection from attack. Man is not so fortunately endowed, and his need for protection extends even to his commercial and industrial life. In the Gas Industry that is where "A & M" Meters come into the picture. The "A & M" Meter is a precision instrument which records faithfully, and for an indefinite period of time, the volume of gas passing through it. Thus the "A & M" Meter affords valuable protection to supplier and consumer alike.

your *protection* is the

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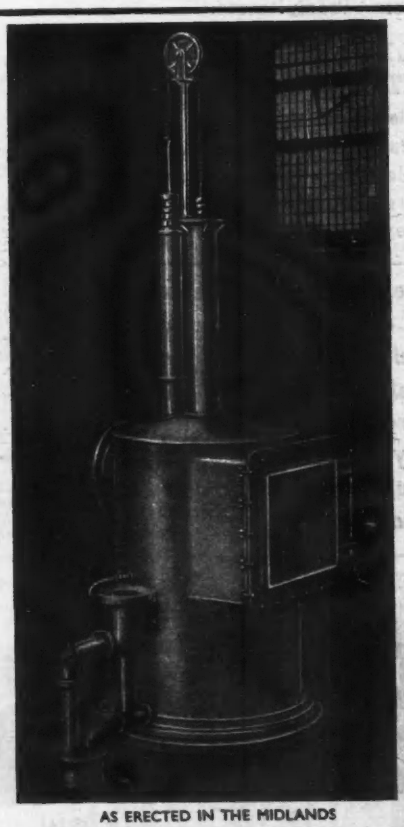

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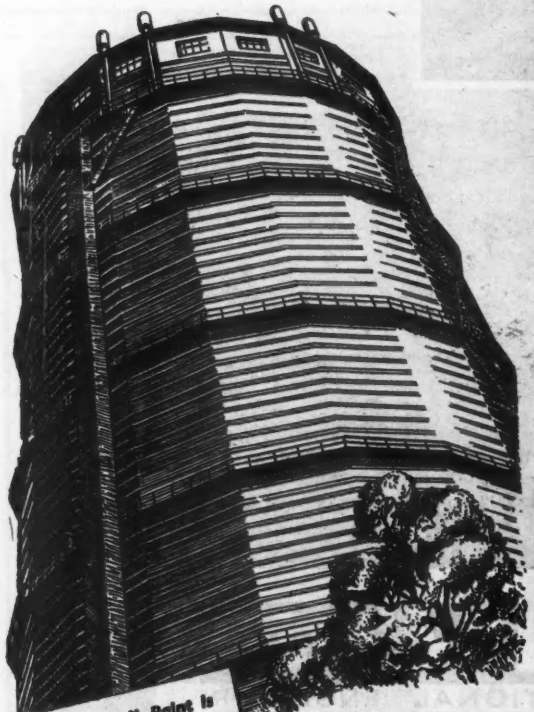

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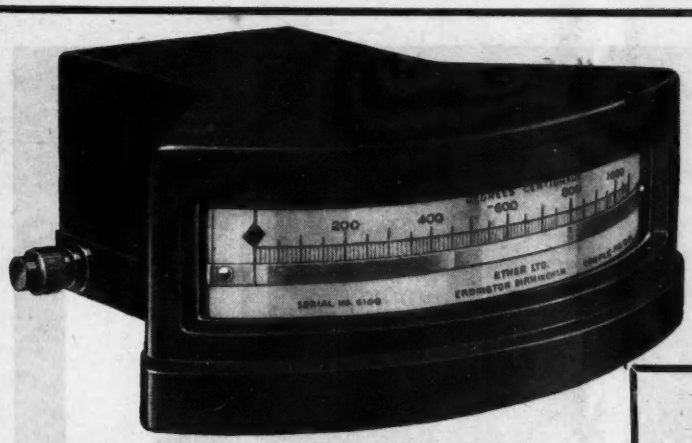

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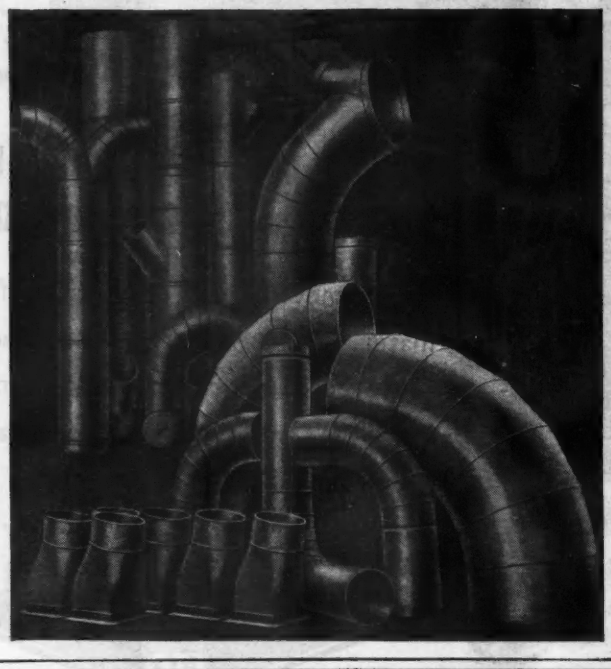
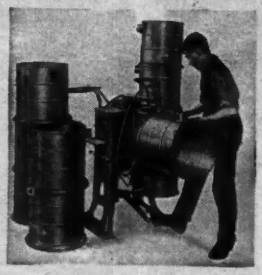


REMEMBER WHO MAKES THEM...



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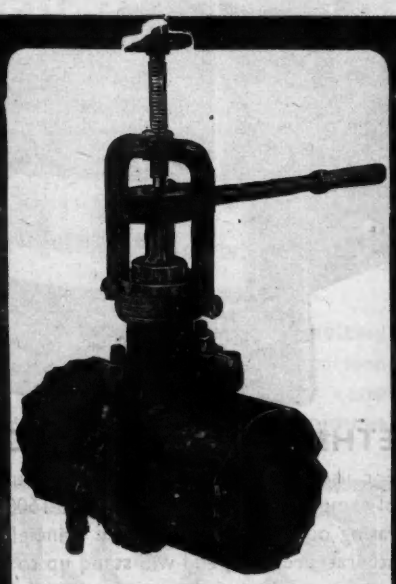

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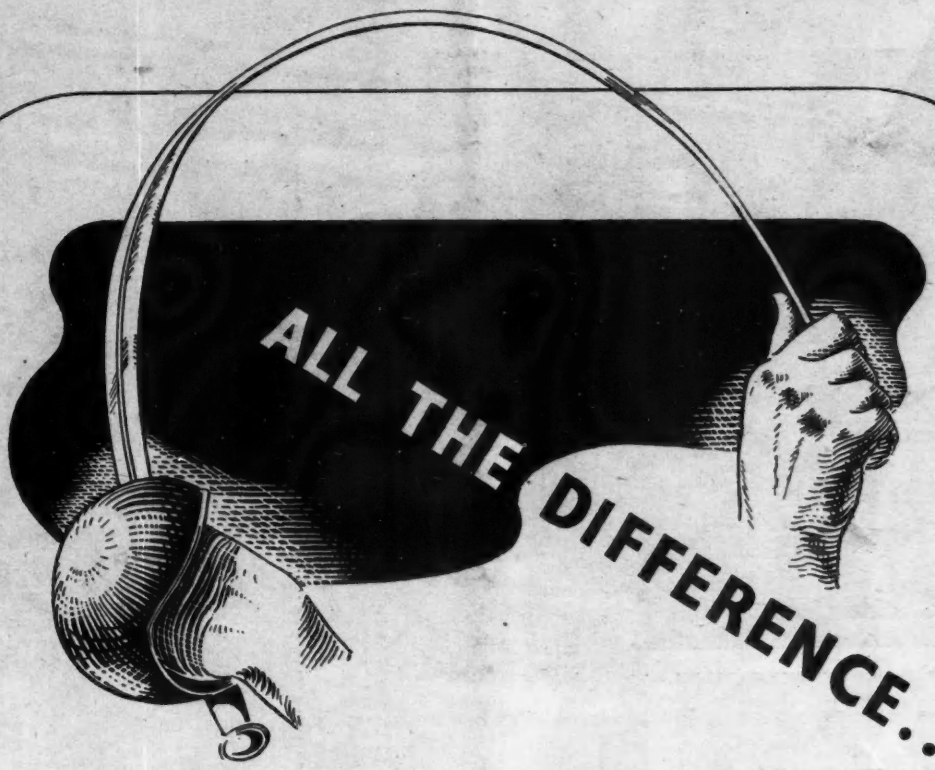

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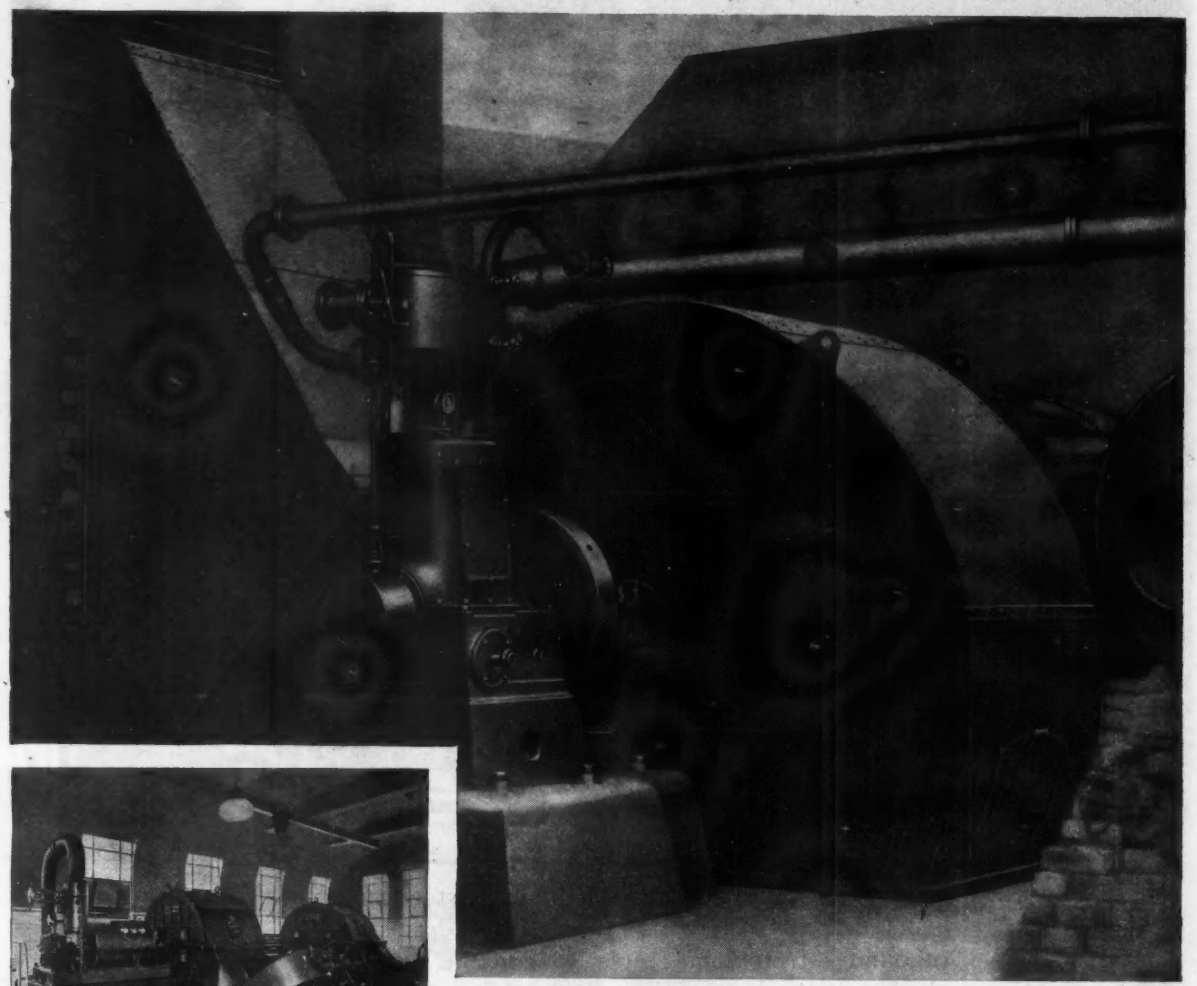
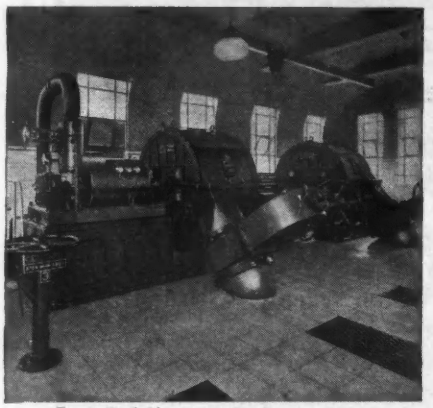


"Keith" Centrifugal Fan providing induced draught to boiler fires.



Two "Keith Blackman" Gas Boosting Fans at large Gas Works.

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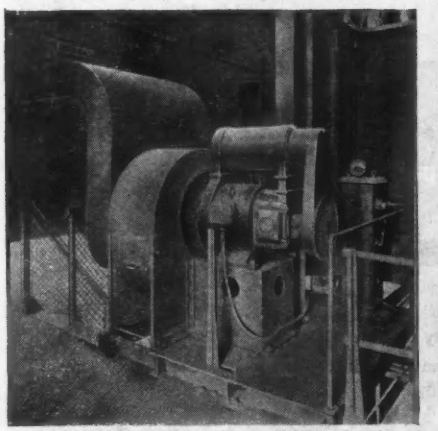
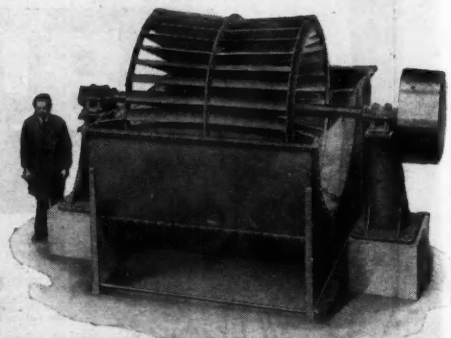


"Keith" Fan supplying air to a Cold Air Douche Plant at a Gas Works.

KEITH BLACKMAN FANS



Large belt-driven double-inlet "Keith" Fan with top casing removed.

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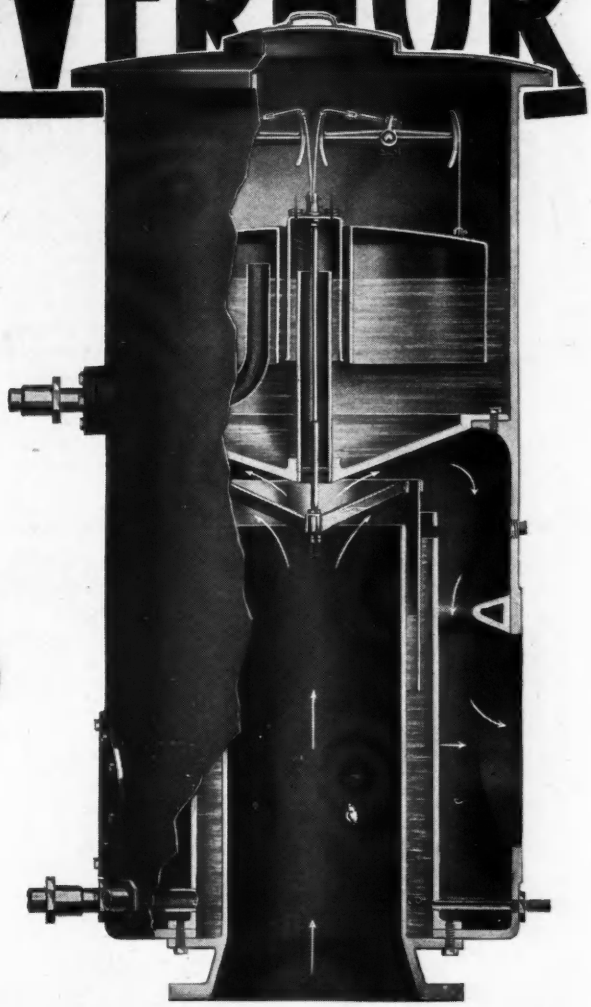

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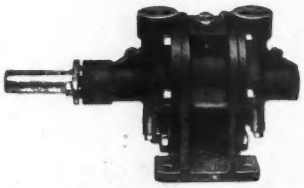

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